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Bellini, III et al.

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(54) **SYSTEMS AND METHODS FOR BUSINESS MANAGEMENT USING PRODUCT DATA WITH PRODUCT CLASSES**

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G06Q 10/00 (2012.01)
G06Q 10/06 (2012.01)

(52) **U.S. Cl.**
CPC ***G06Q 10/06313*** (2013.01)

(58) **Field of Classification Search**
CPC G06Q 10/06313
See application file for complete search history.

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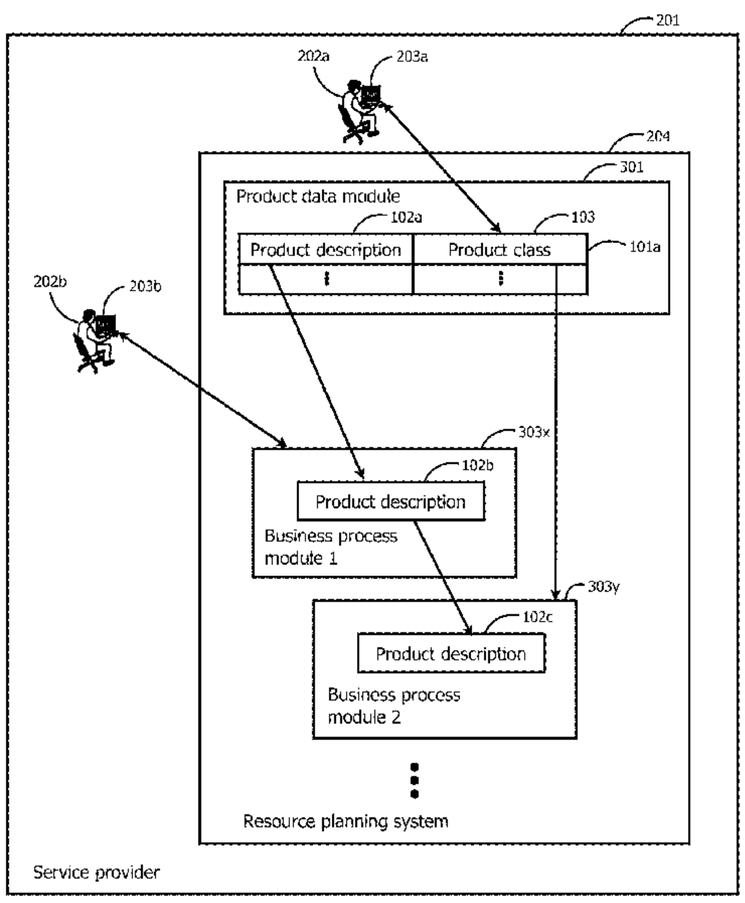
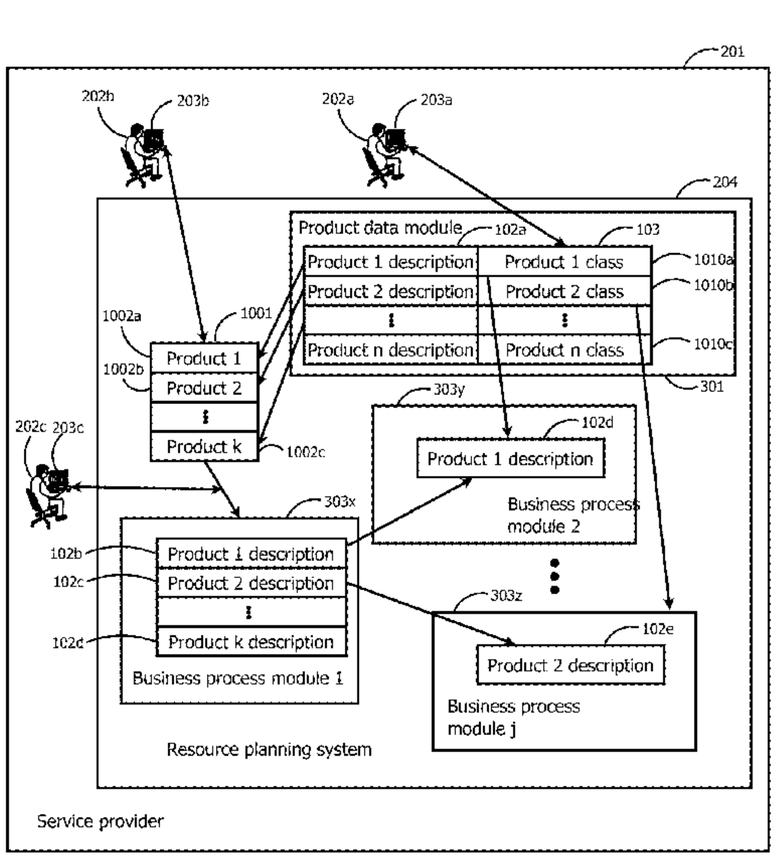
Primary Examiner — Jonathan G Sterrett
(74) *Attorney, Agent, or Firm* — Foley & Lardner LLP

(57) **ABSTRACT**

Systems and methods of the present disclosure facilitate managing a business. In some embodiments, the system includes a product data module and a plurality of business process modules executing on at least one processor of a server. The product data module may be configured to store at least one product description. Responsive to a first user, the system may associate a product class with a first description. Responsive to a second user, the system may associate a first product description with a first of the business process modules. The system may be configured to select a second business process module based on the product class and update the second business process module with the first product description.

18 Claims, 40 Drawing Sheets





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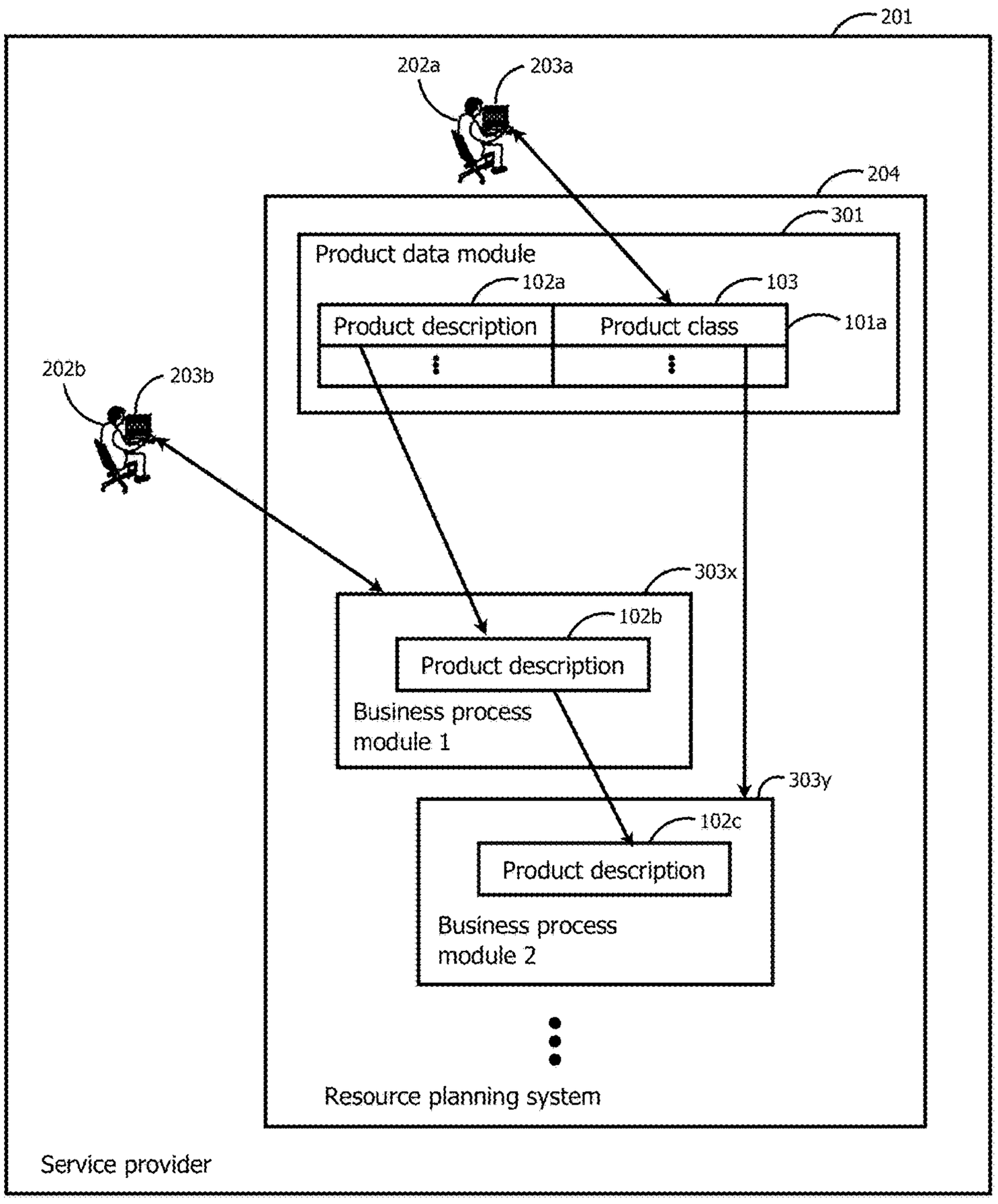
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Product description
Product class
101a
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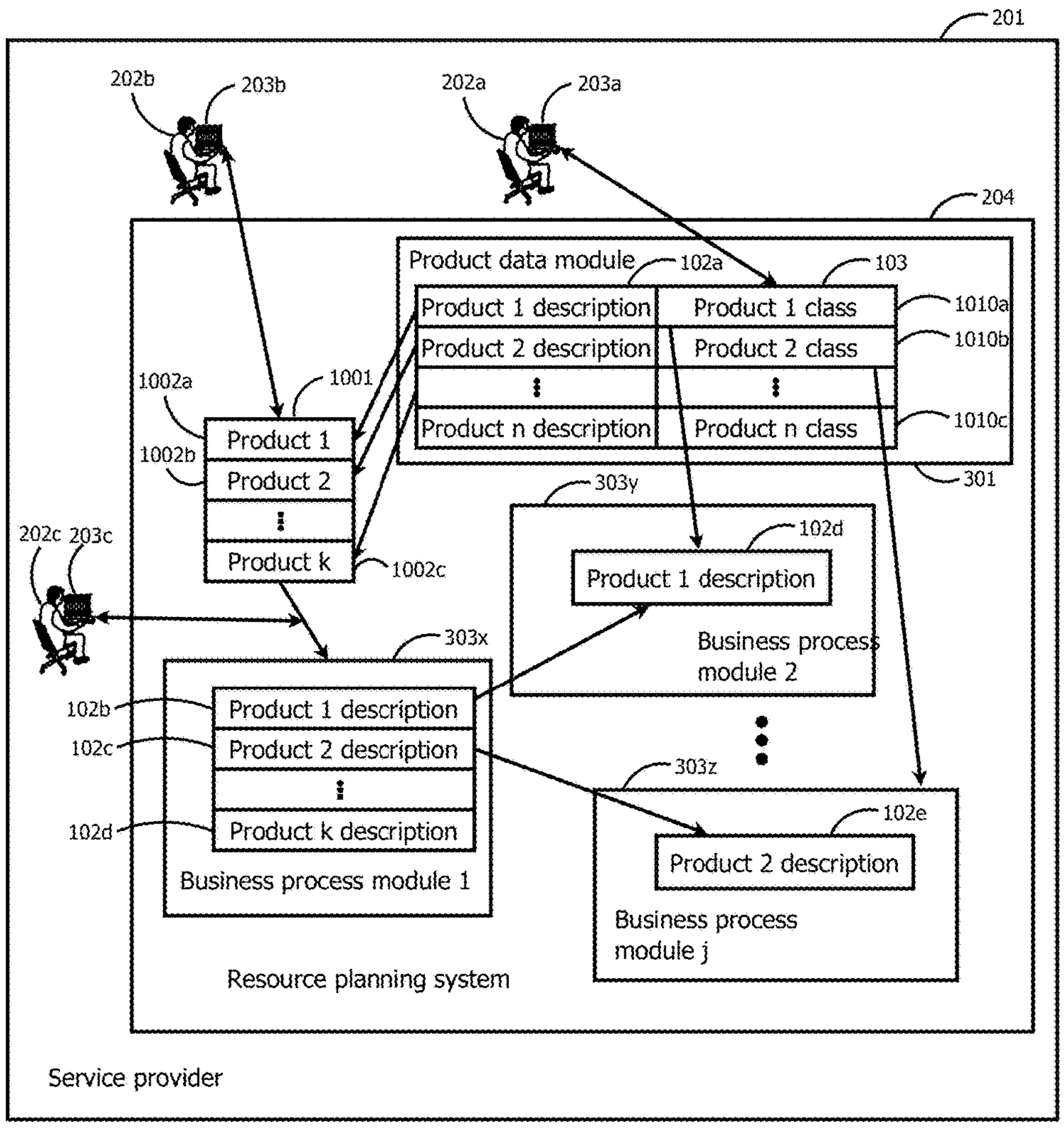
102b
Product description
Business process module 1
303y
102c
Product description
Business process module 2
Resource planning system
Service provider

Fig. 1A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1010a
Product 2 description
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1010b
Product n description
Product n class
1010c
301
1002a
1001
Product 1
1002b
Product 2
Product k
1002c
303y
102d
Product 1 description
Business process module 2
202c
203c
303x
102b
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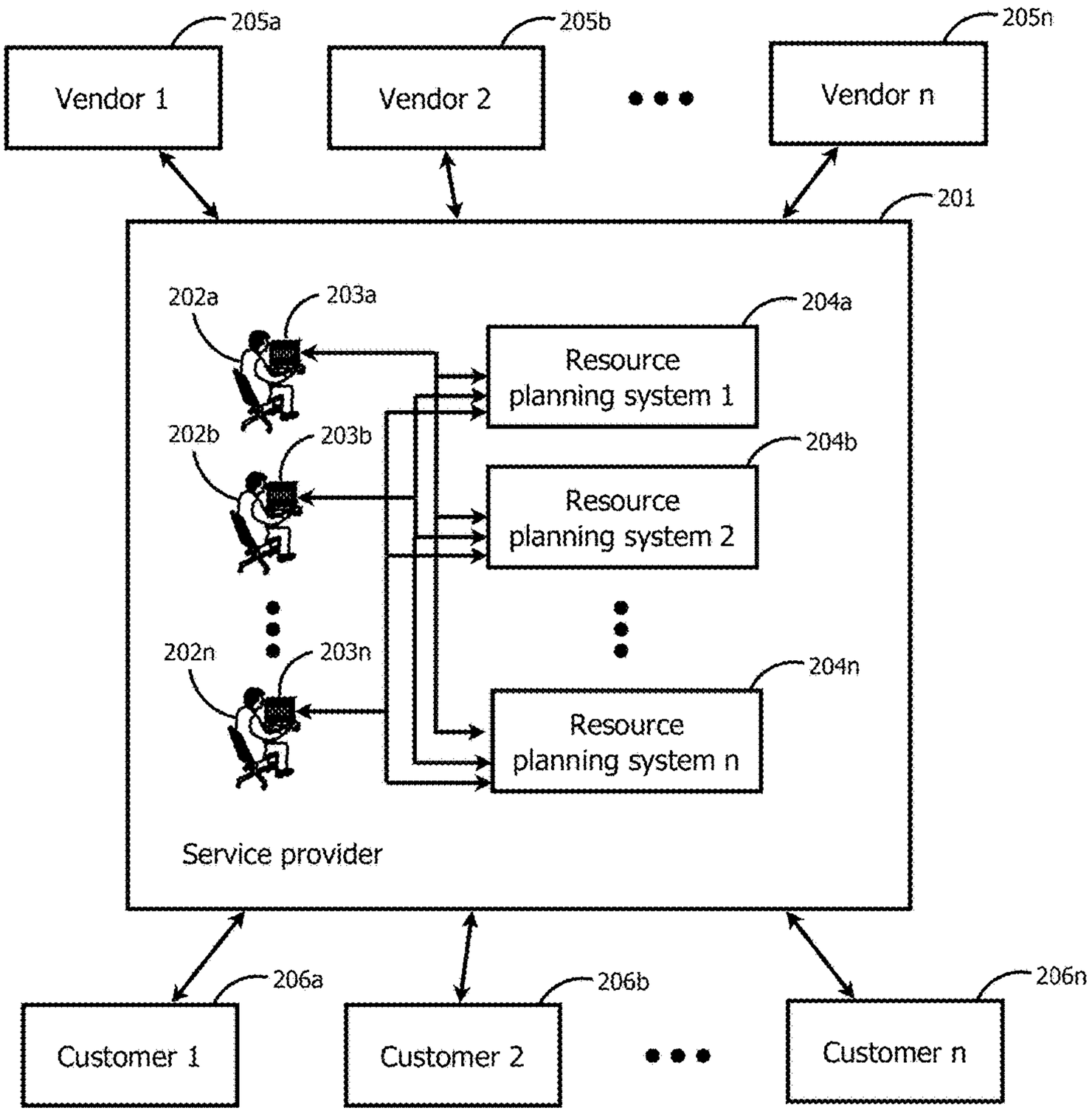
102e
Product 2 description
Business process module j
Resource planning system
Service provider

Fig. 1B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205n
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Vendor 2
Vendor n
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Resource planning system 2
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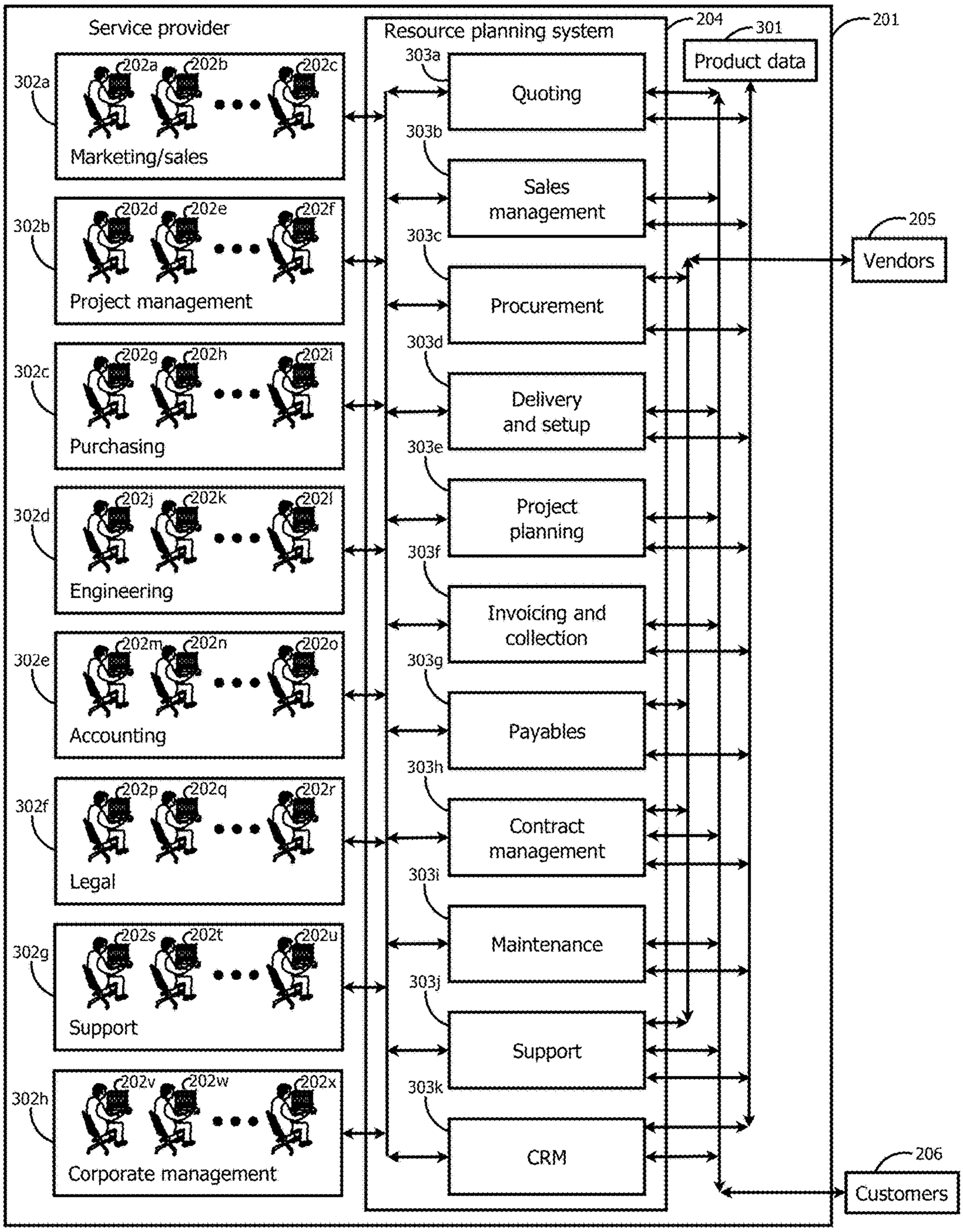
204n
Resource planning system n
Service provider
206a
206b
206n
Customer 1
Customer 2
Customer n

Fig. 2


Service provider
Resource planning system
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301
Product data
201
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Quoting
303b
Sales management
303c
Procurement
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Delivery and setup
303e
Project planning
303f
Invoicing and collection
303g
Payables
303h
Contract management
303i
Maintenance
303j
Support
303k
CRM
205
Vendors
206
Customers
302a
202a
202b
202c
Marketing/sales
302b
202d
202e
202f
Project management
302c
202g
202h
202i
Purchasing
302d
202j
202k
202l
Engineering
302e
202m
202n
202o
Accounting
302f
202p
202q
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Legal
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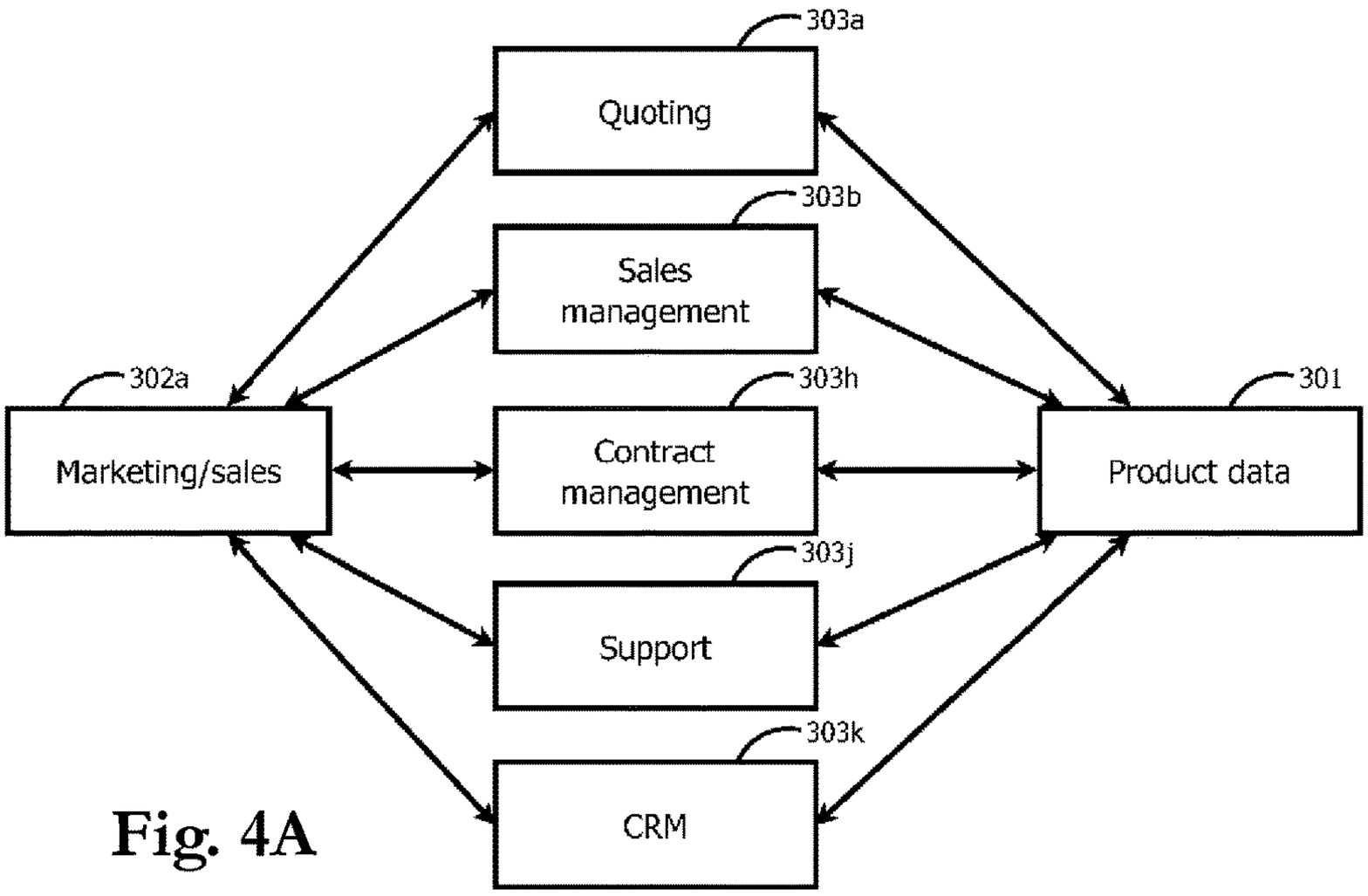
202t
202u
Support
302h
202v
202w
202x
Corporate management

Fig. 3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Quoting
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Sales management
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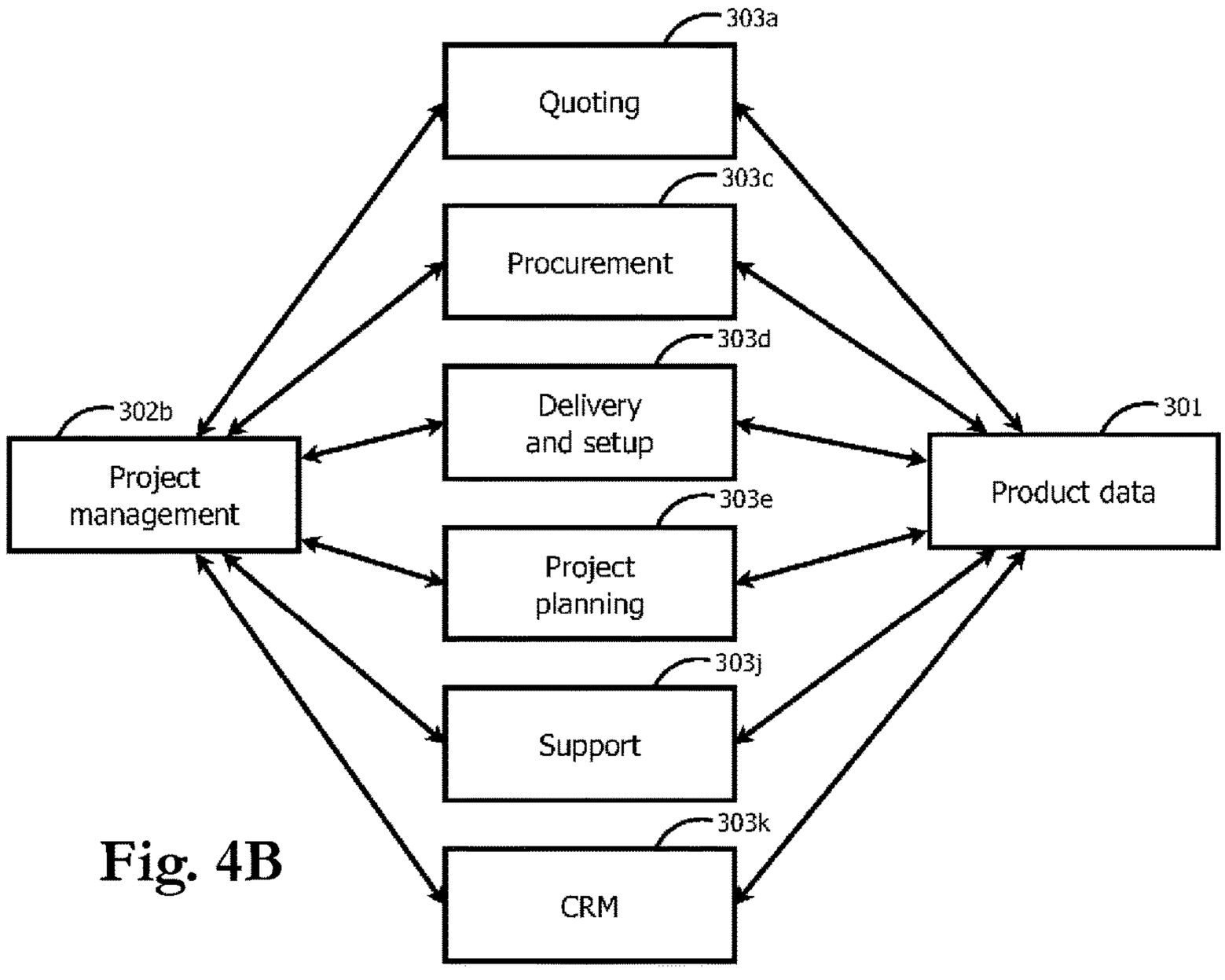
Marketing/sales
Contract management
Product data
303j
Support
303k
CRM

Fig. 4A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Procurement
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302b
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Project management
Product data
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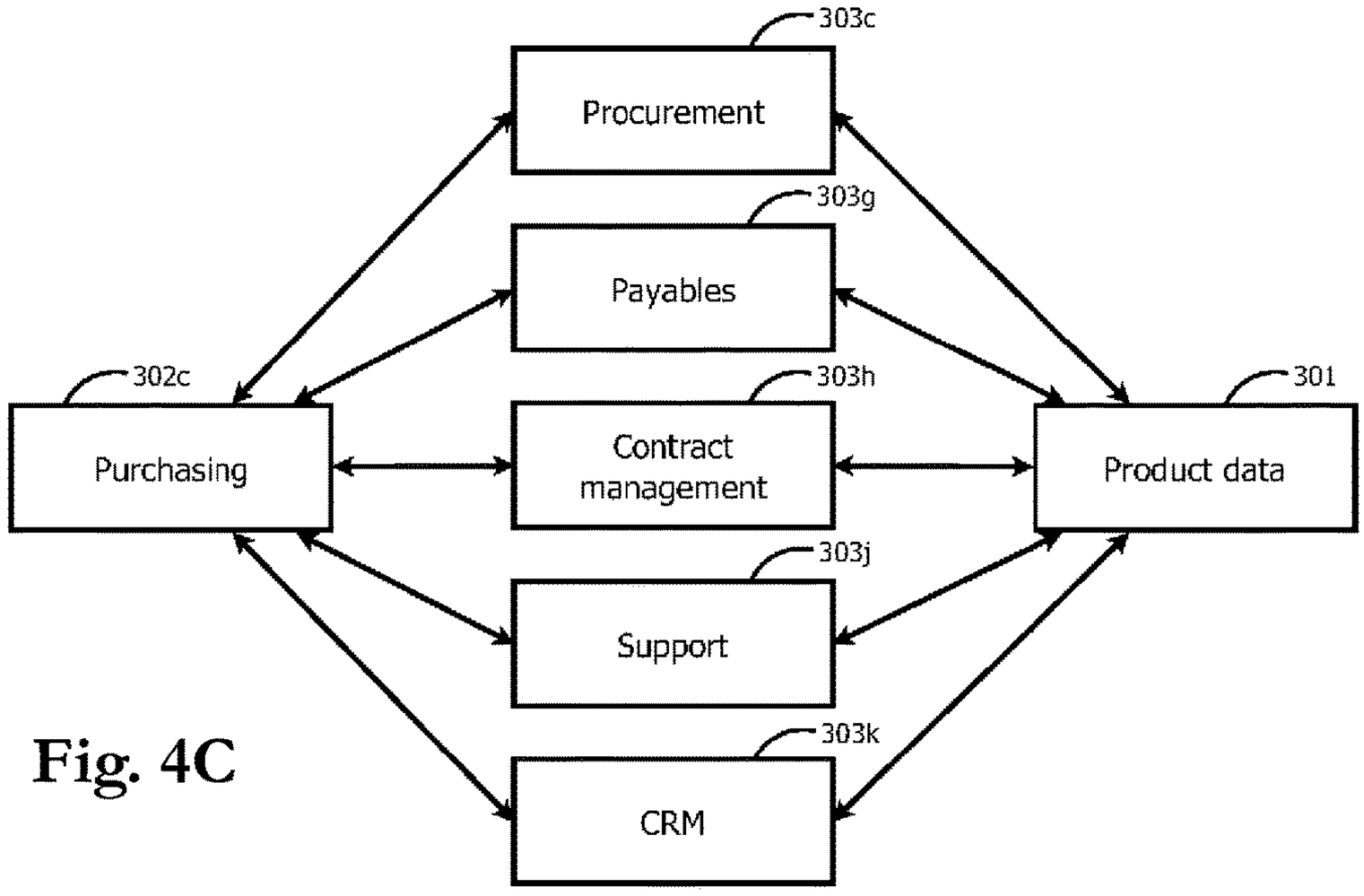
Project planning
303j
Support
303k
CRM

Fig. 4B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Procurement
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Payables
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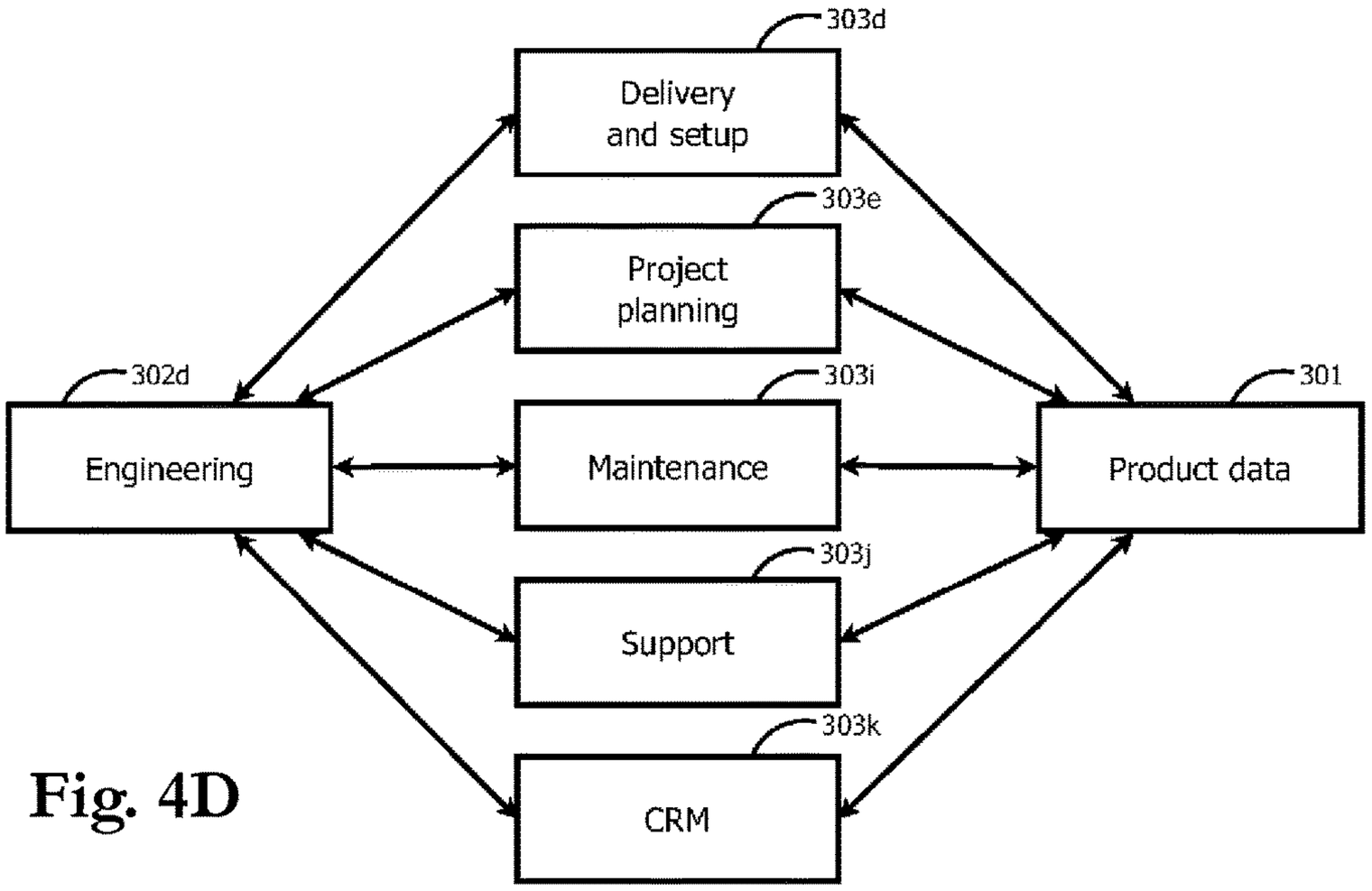
301
Purchasing
Contract management
Product data
303j
Support
303k
CRM

Fig. 4C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Delivery and setup
303e
Project planning
302d
303i
301
Engineering
Maintenance
Product data
303j
Support
303k
CRM

Fig. 4D

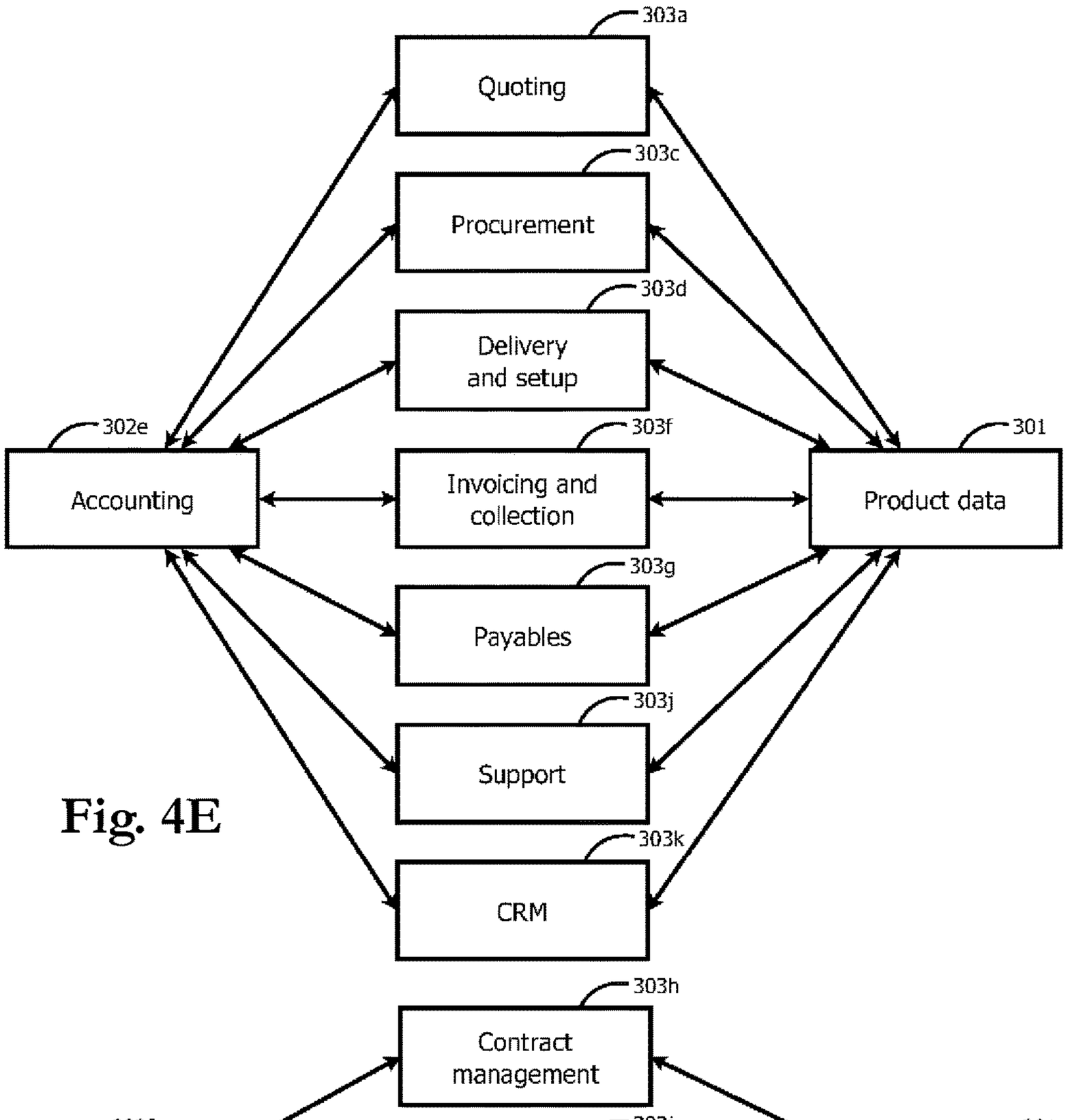
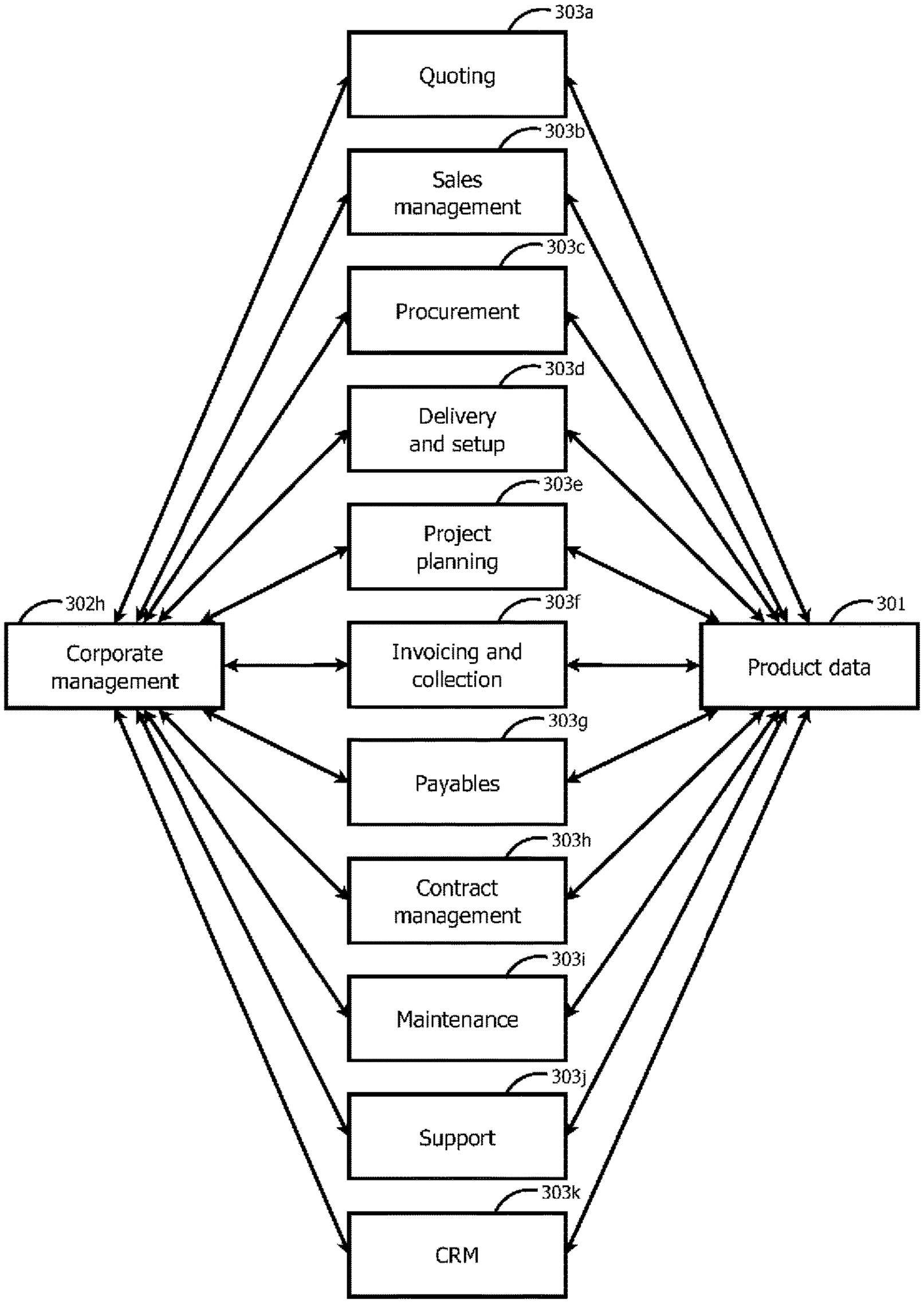


Fig. 4E

Fig. 4F

Fig. 4G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Sales management
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Procurement
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Delivery and setup
303e
Project planning
302h
Corporate management
303f
Invoicing and collection
301
Product data
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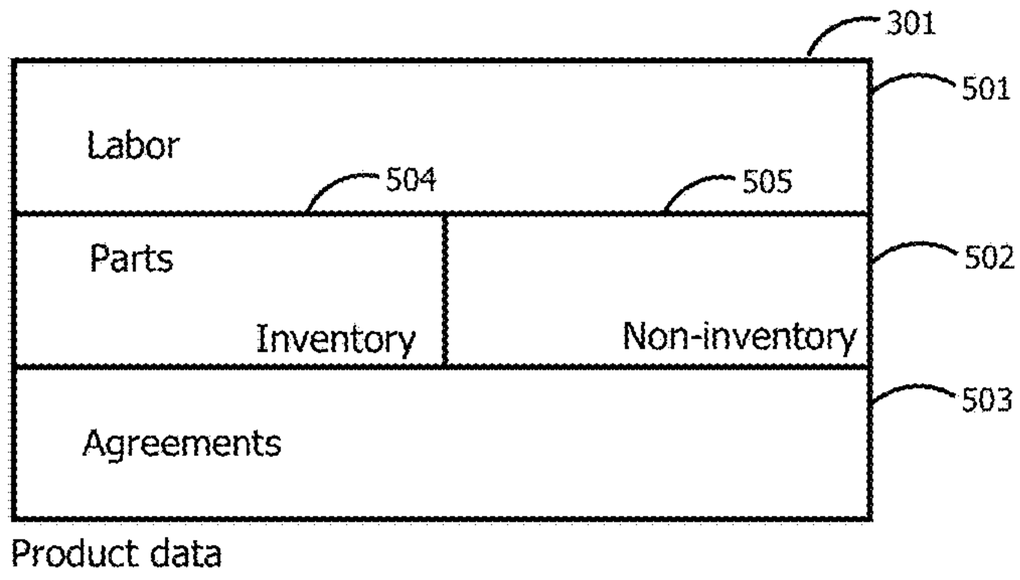
Payables
303h
Contract management
303i
Maintenance
303j
Support
303k
CRM

Fig. 4H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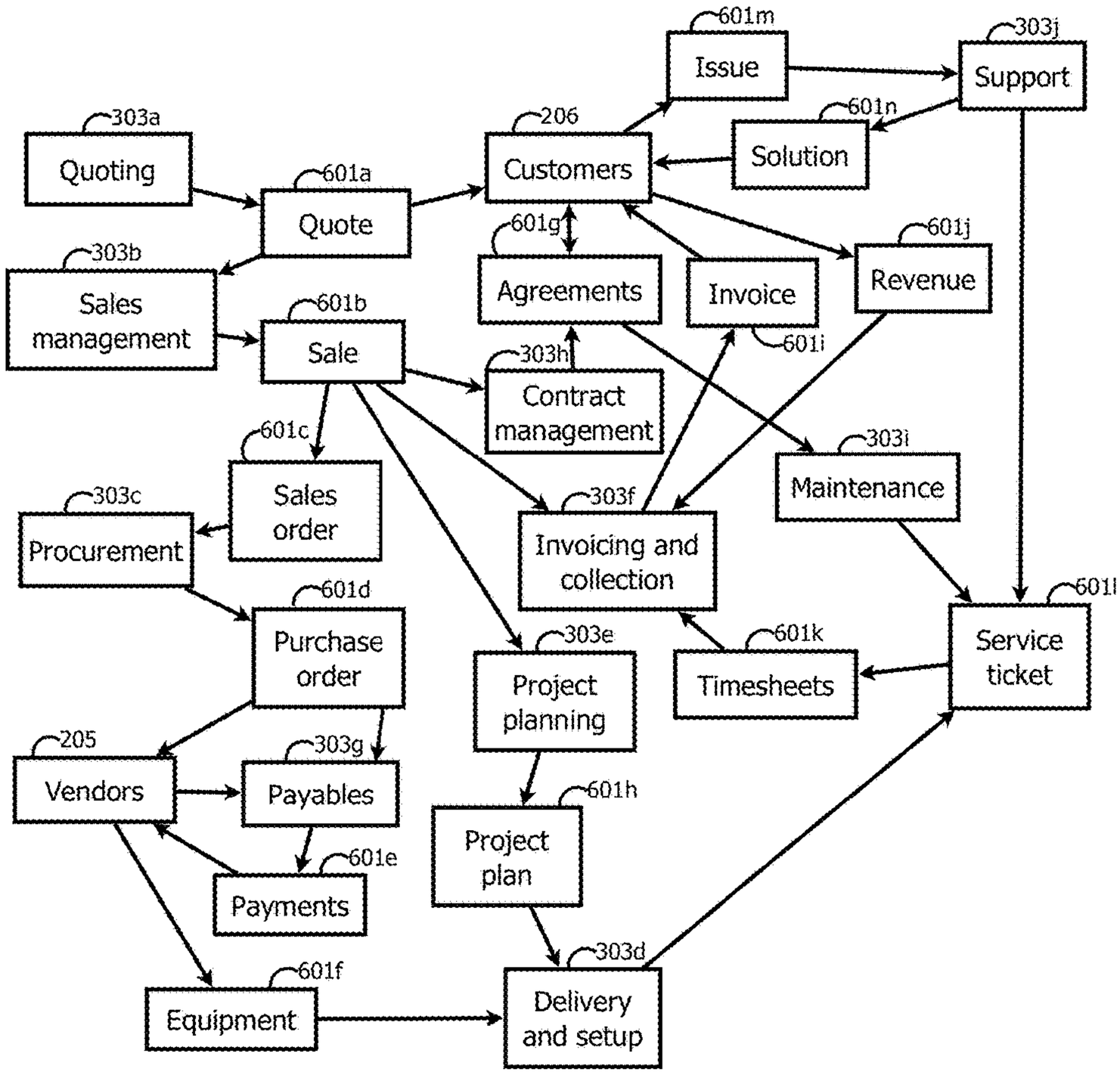
Labor
504
505
Parts
Inventory
Non-inventory
502
503
Agreements
Product data

Fig. 5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Issue
303j
Support
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Quoting
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Customers
601n
Solution
601a
Quote
601g
601j
303b
Sales management
Agreements
Invoice
Revenue
601b
Sale
601i
303h
Contract management
601c
303i
Maintenance
Sales order
303f
303c
Procurement
Invoicing and collection
601d
601l
Purchase order
303e
601k
Service ticket
Project planning
Timesheets
205
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Vendors
Payables
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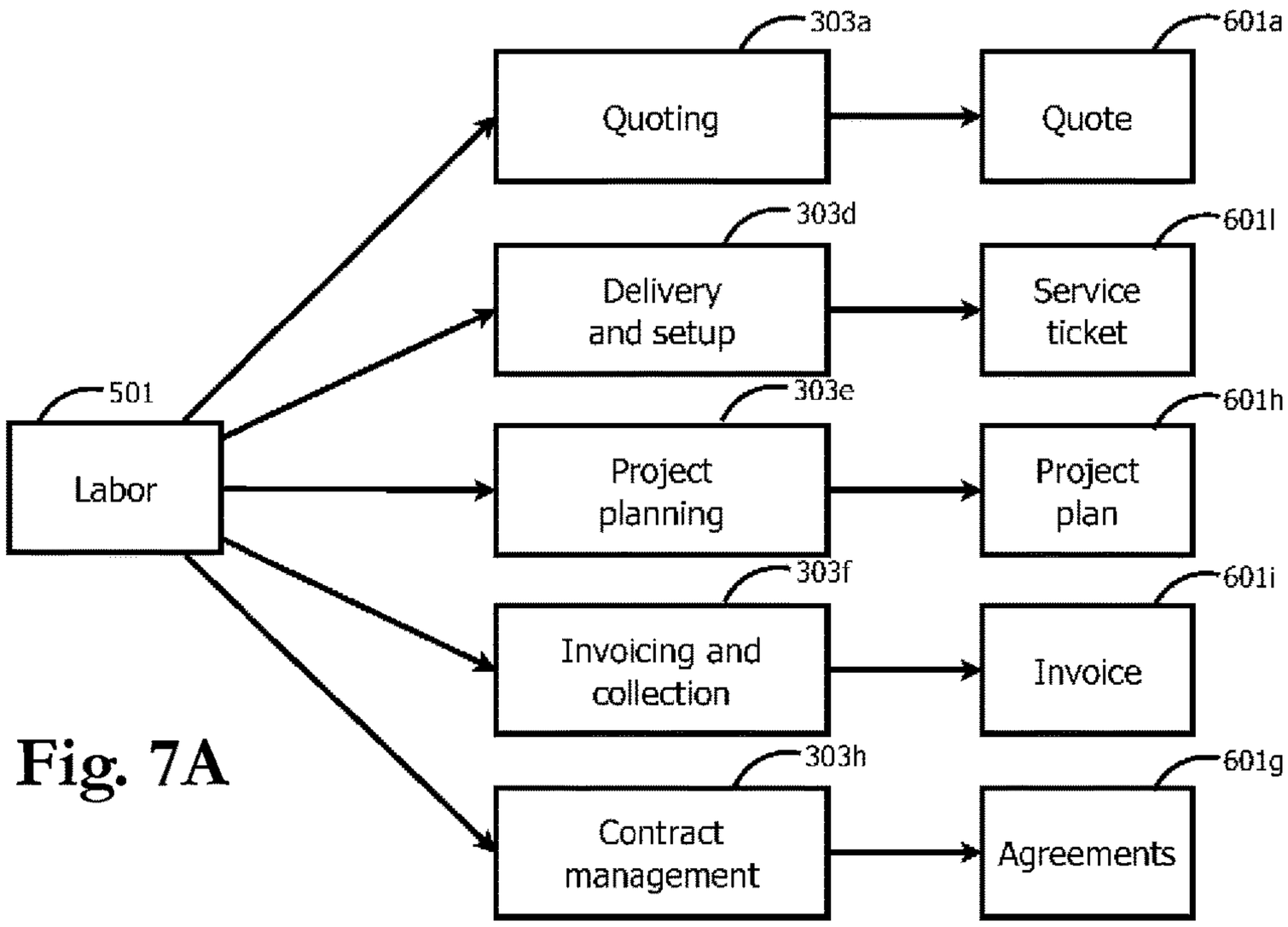
Project plan
601e
Payments
303d
601f
Equipment
Delivery and setup

Fig. 6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Labor
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Delivery and setup
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Service ticket
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Project planning
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Project plan
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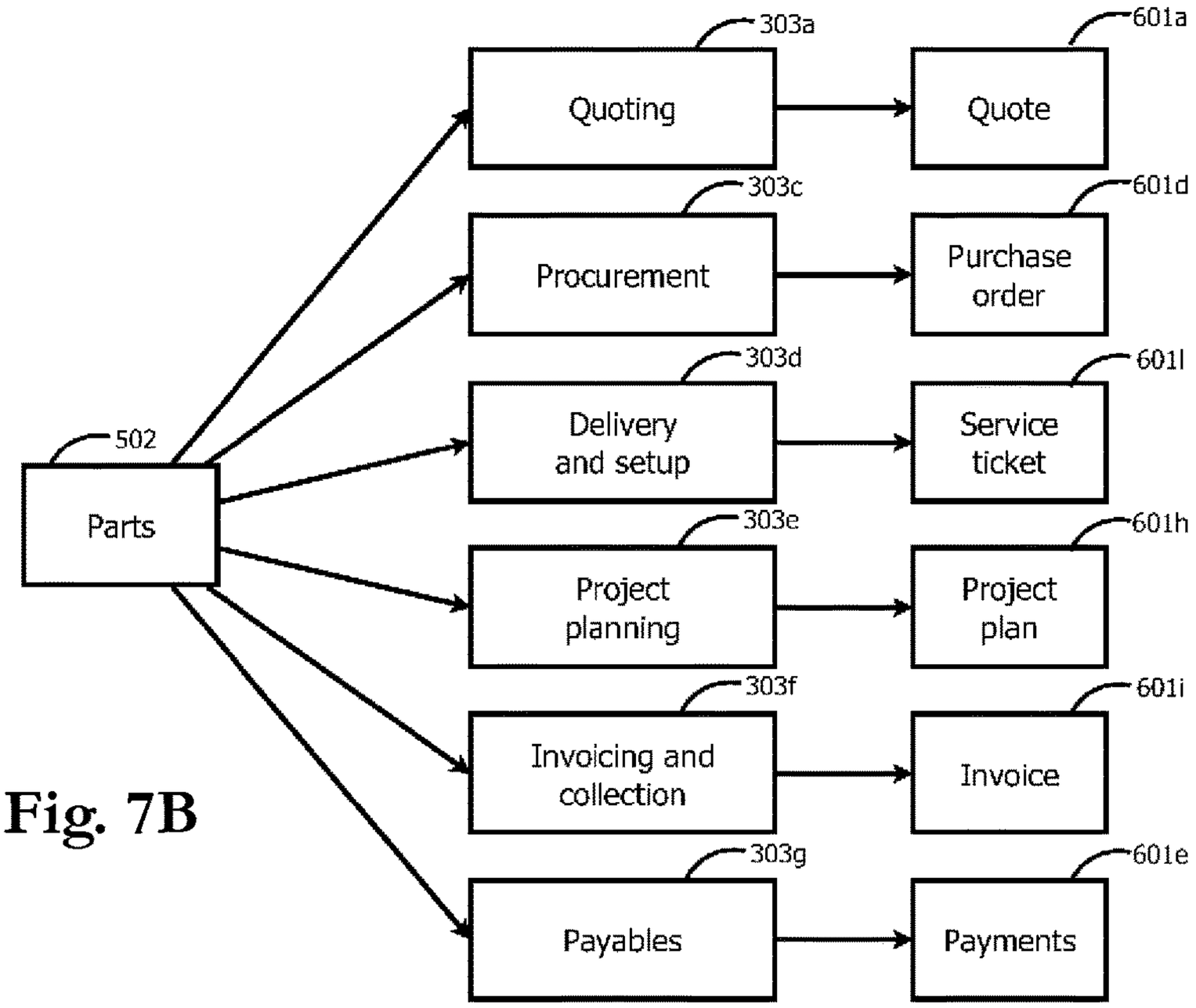
Invoicing and collection
601i
Invoice
303h
Contract management
601g
Agreements

Fig. 7A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Purchase order
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Delivery and setup
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Service ticket
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Project planning
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Project plan
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Invoicing and collection
601i
Invoice
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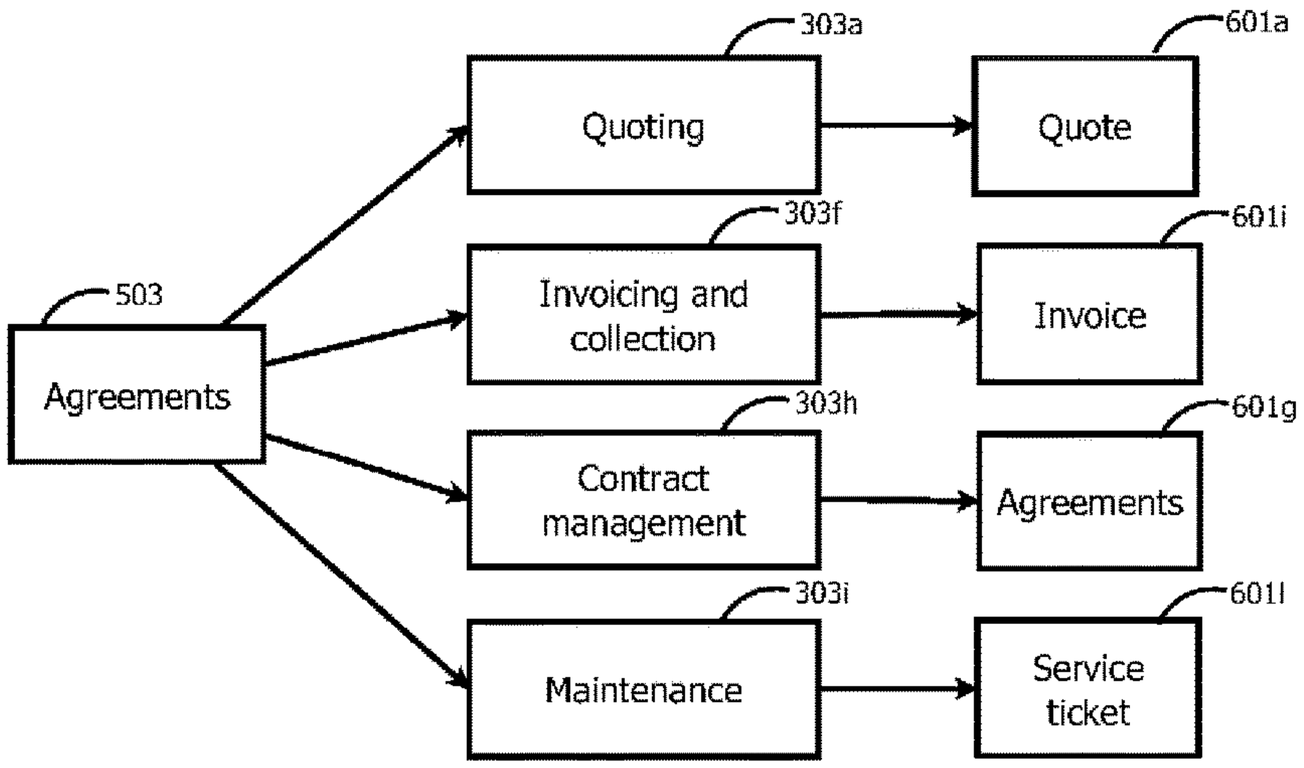
Payables
601e
Payments

Fig. 7B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Agreements
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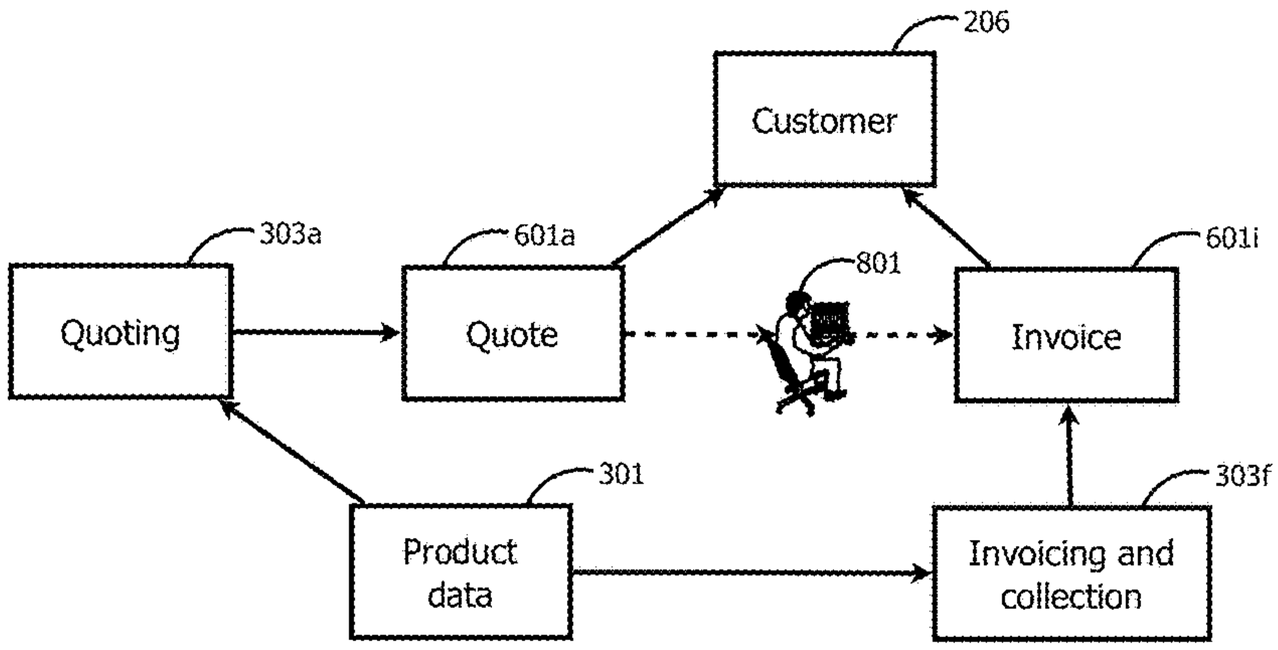
Maintenance
601l
Service ticket

Fig. 7C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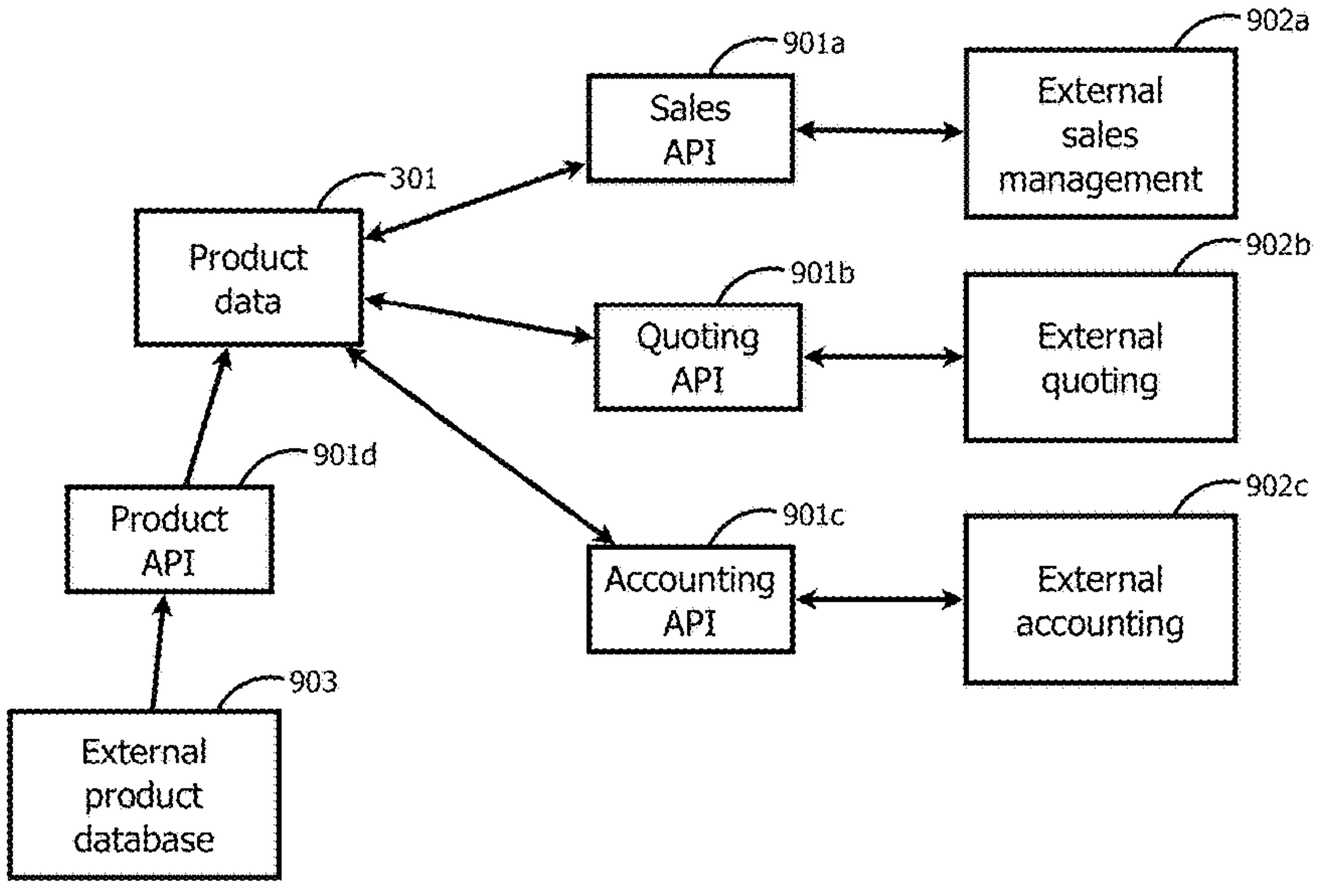
Invoicing and collection

Fig. 8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External quoting
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Product API
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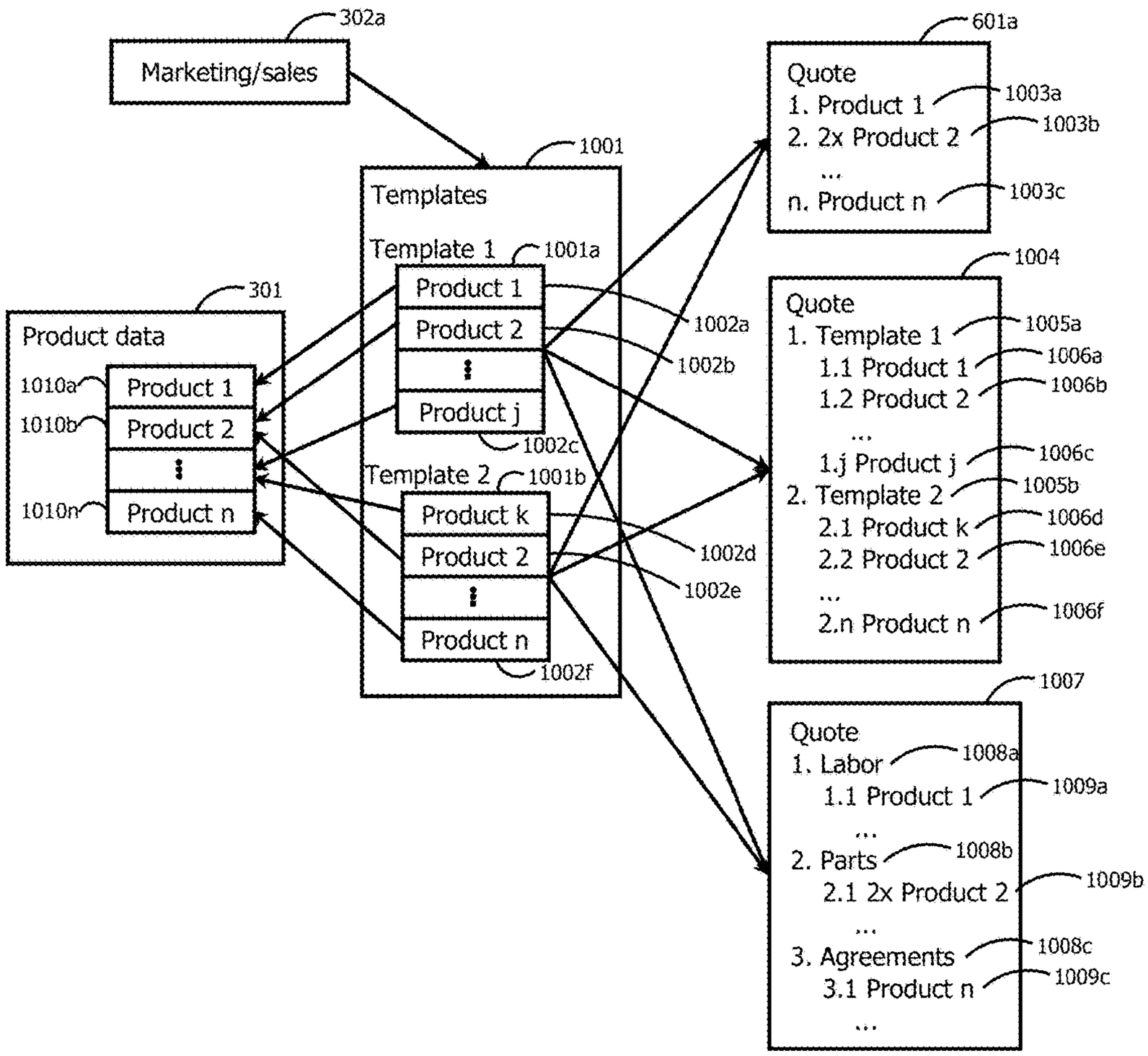
Accounting API
902c
External accounting
903
External product database

Fig. 9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Product 2
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Template 2
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Product k
Product 2
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Product 1
1010b
Product 2
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Product n
1002a
1002b
1002d
1002e
601a
Quote
1. Product 1
1003a
2. 2x Product 2
1003b
...
n. Product n
1003c
1004
Quote
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1006a
1.2 Product 2
1006b
...
1.j Product j
1006c
2. Template 2
1005b
2.1 Product k
1006d
2.2 Product 2
1006e
...
2.n Product n
1006f
1007
Quote
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1.1 Product 1
1009a
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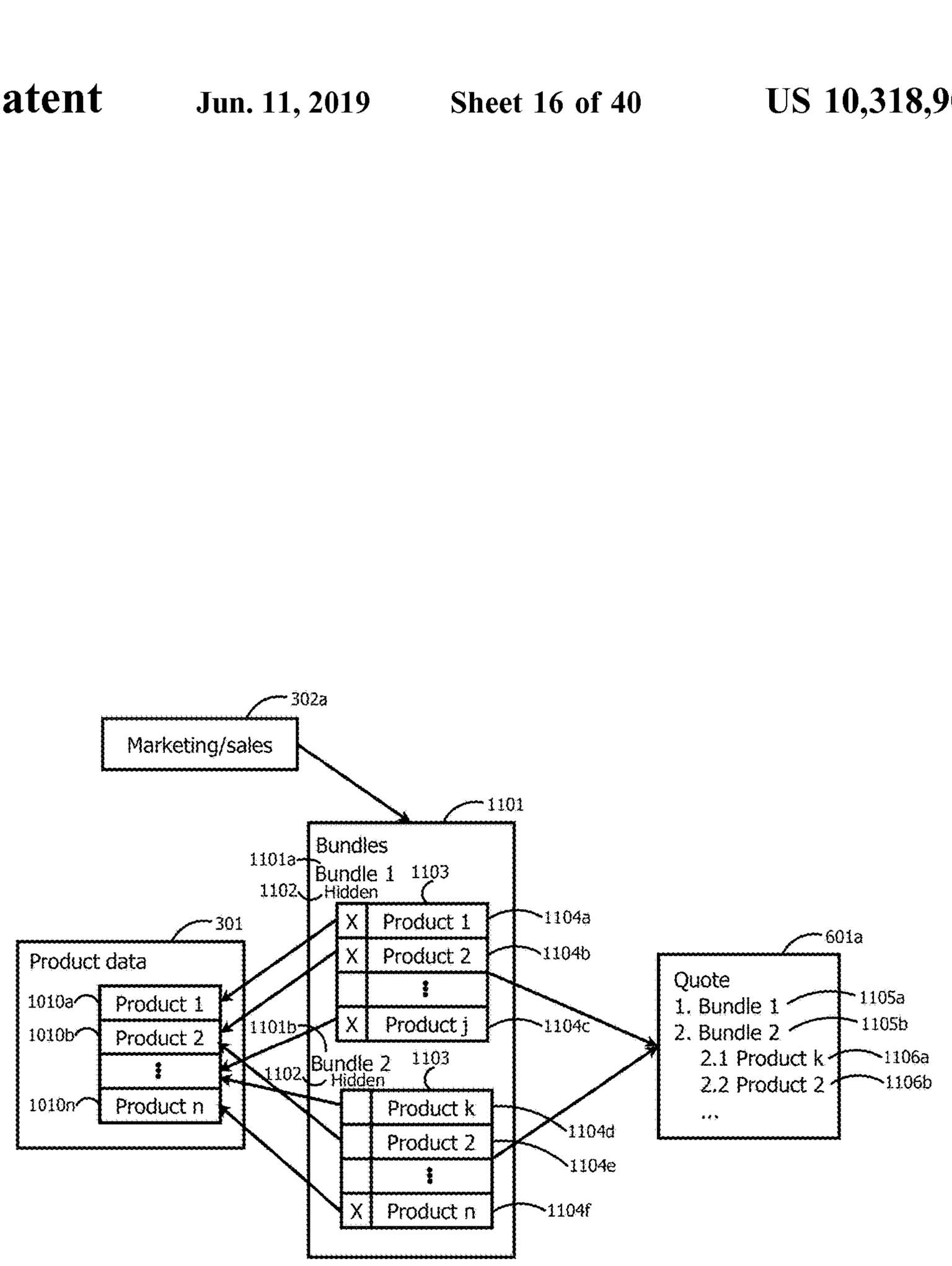
Fig. 10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Hidden
Product k
1104d
Product 2
1104e
X
Product n
1104f
601a
Quote
1. Bundle 1
1105a
2. Bundle 2
1105b
2.1 Product k
1106a
2.2 Product 2
1106b
...

Fig. 11

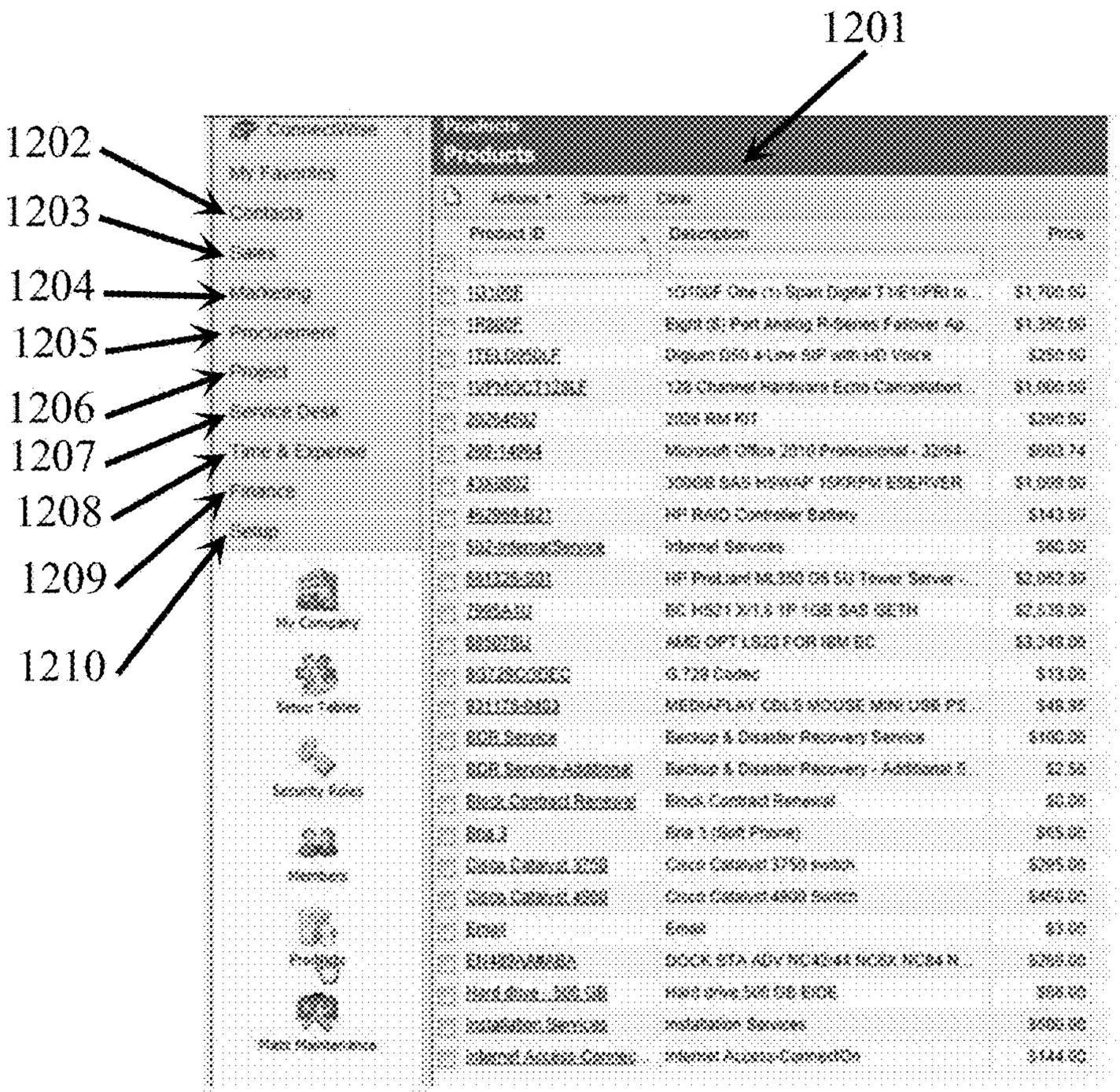

Fig. 12

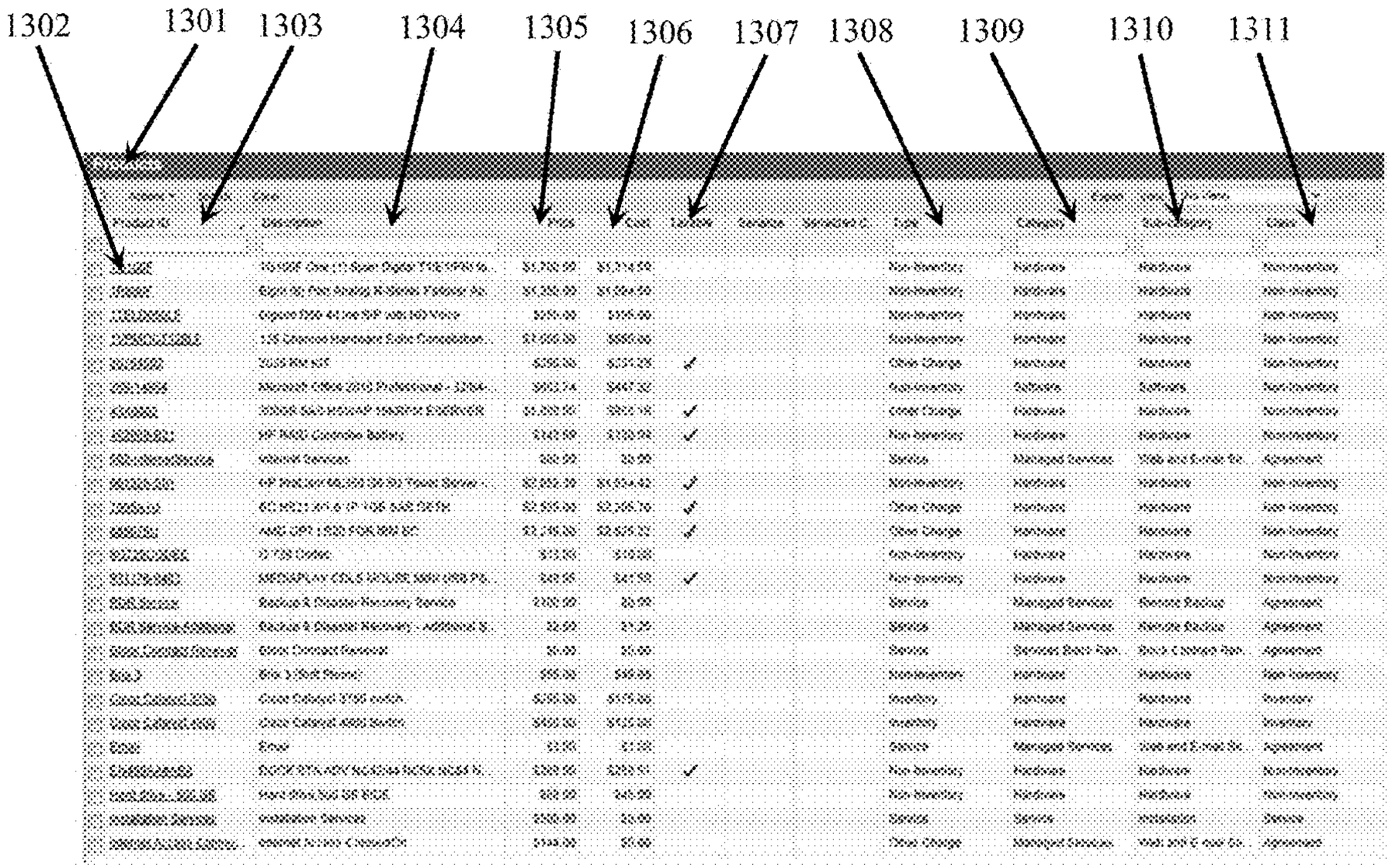

Fig. 13

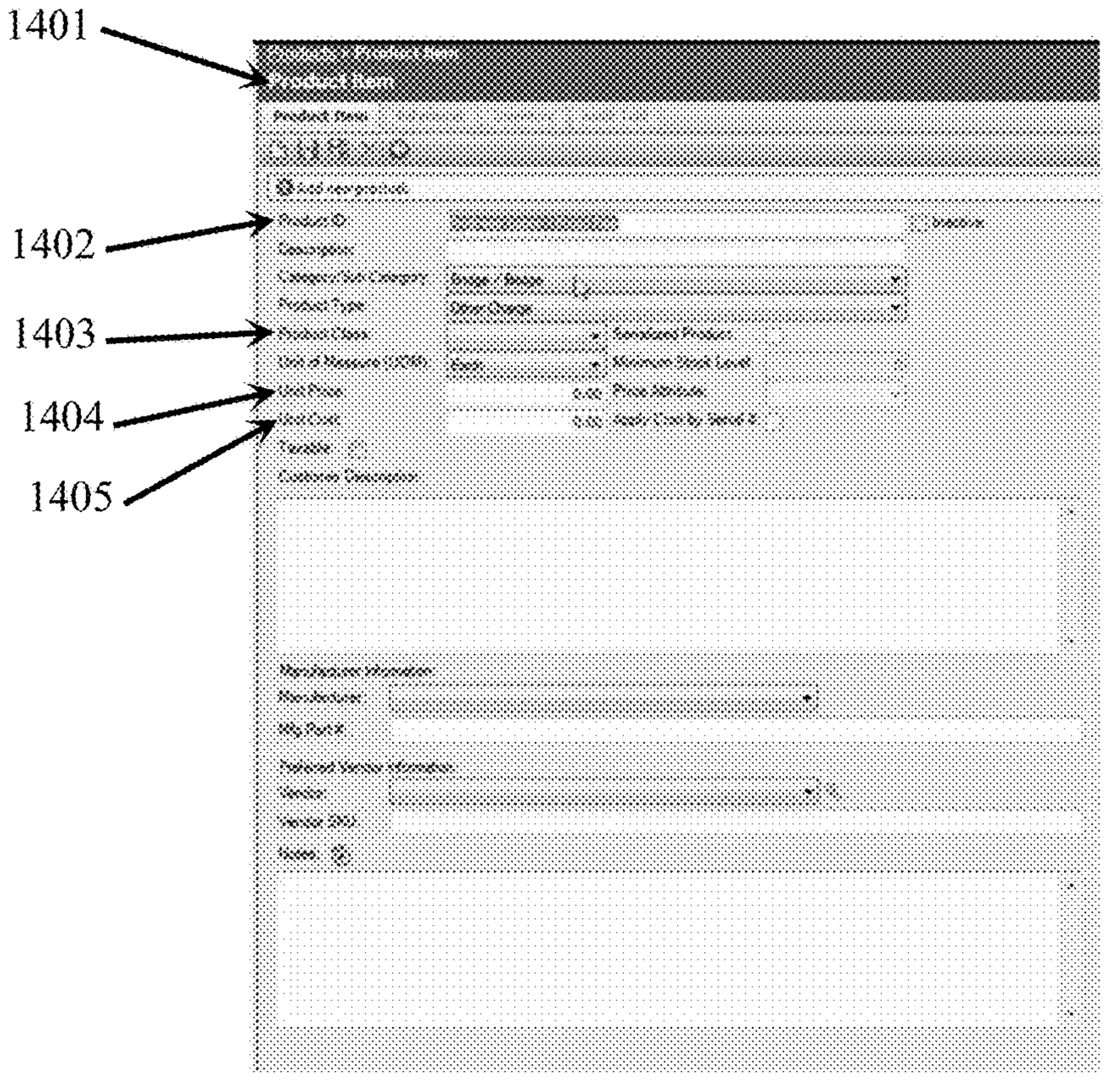

Fig. 14

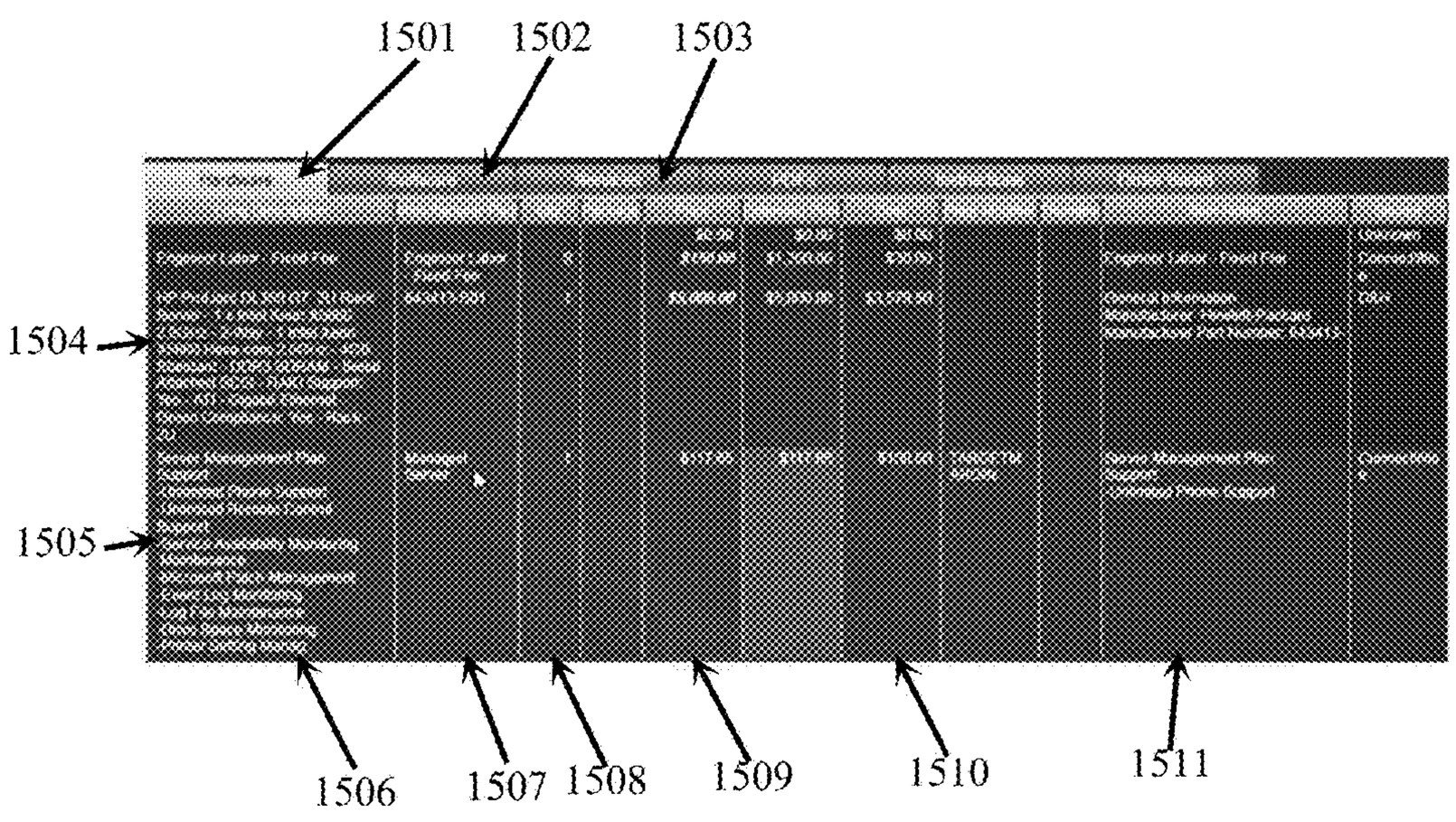

Fig. 15

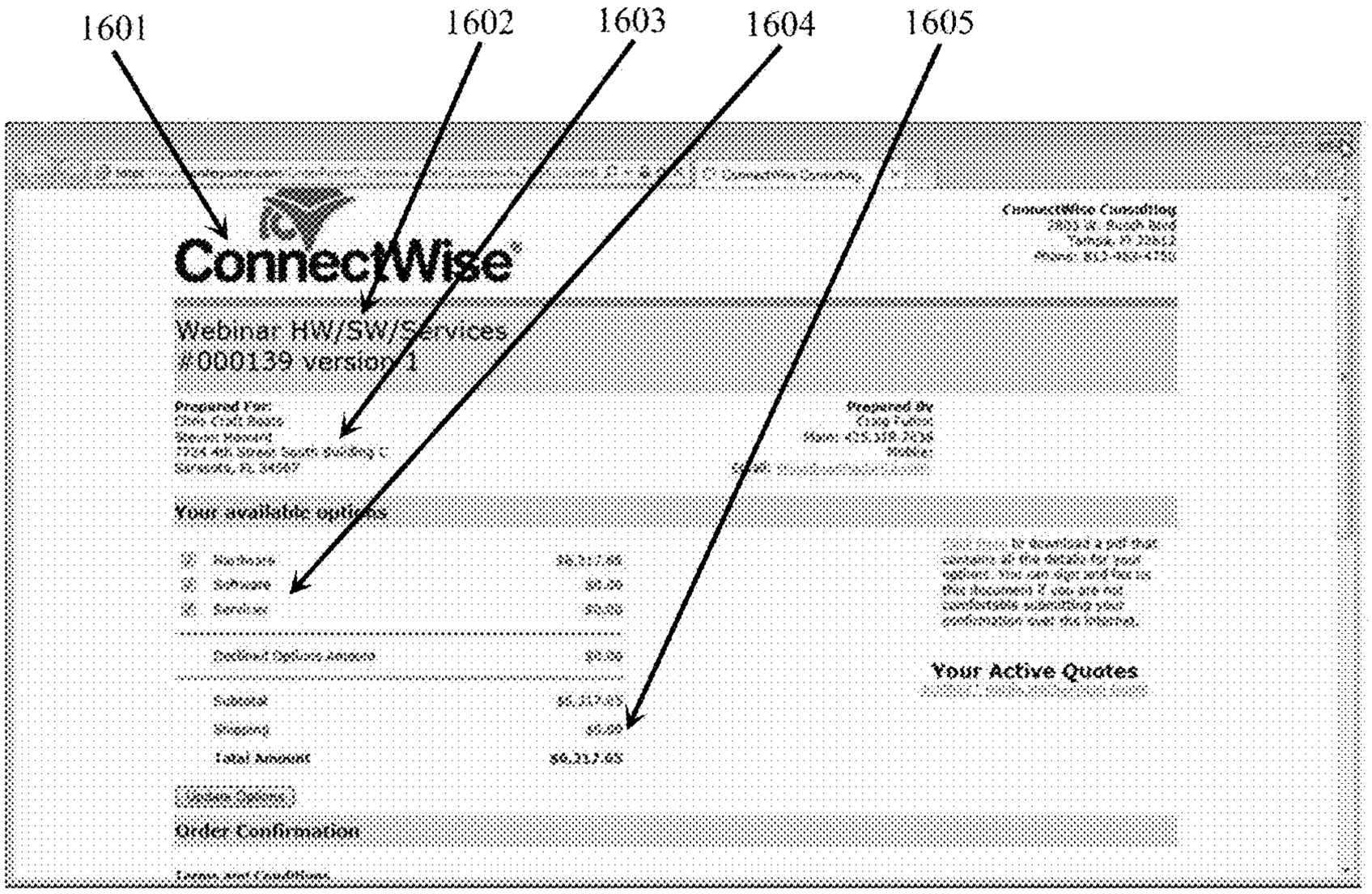
1601
1602
1603
1604
1605
ConnectWise
Webinar HW/SW/Services
#000139 version 1
Your available options
Your Active Quotes
Order Confirmation

Fig. 16

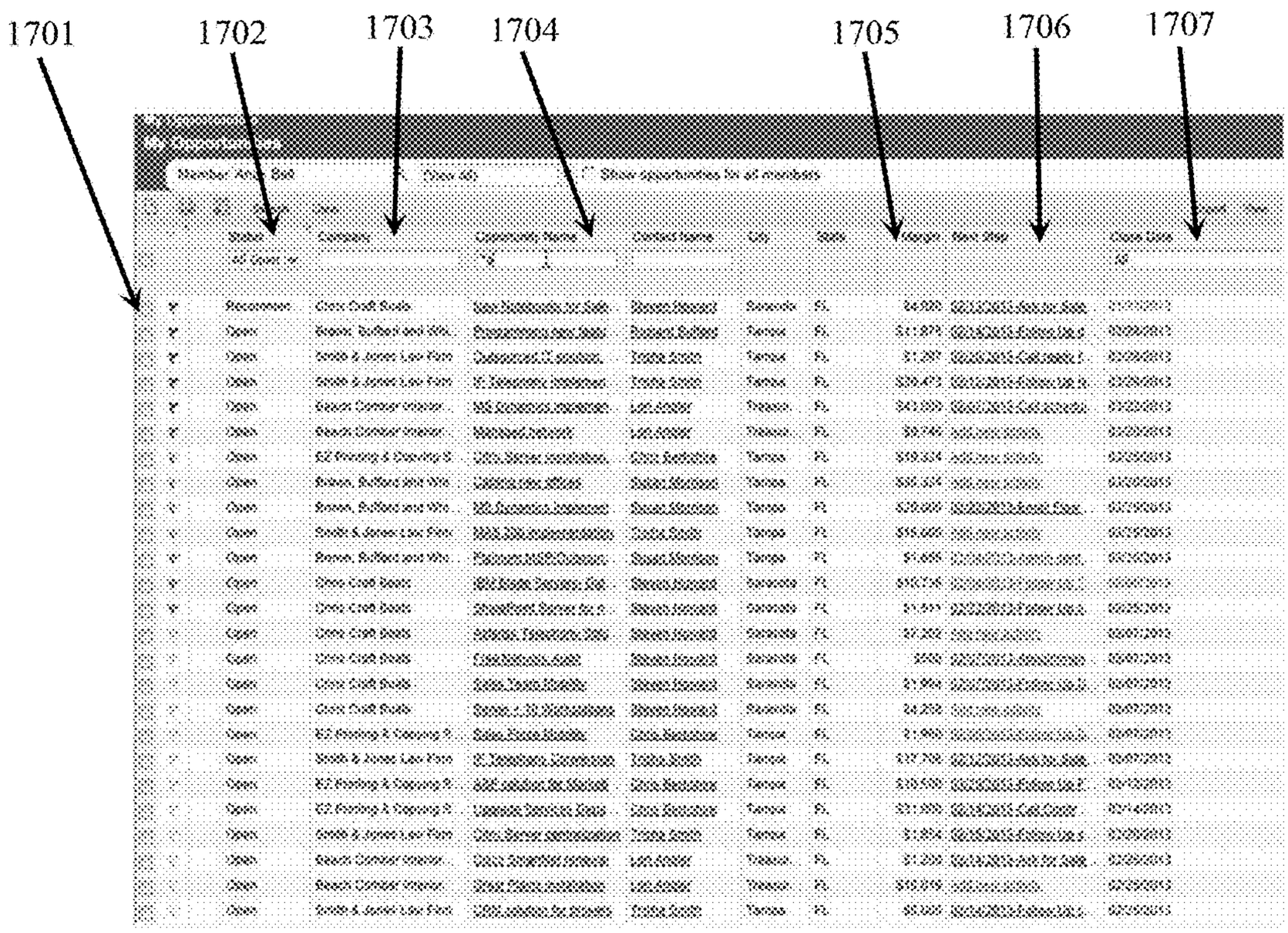

Fig. 17

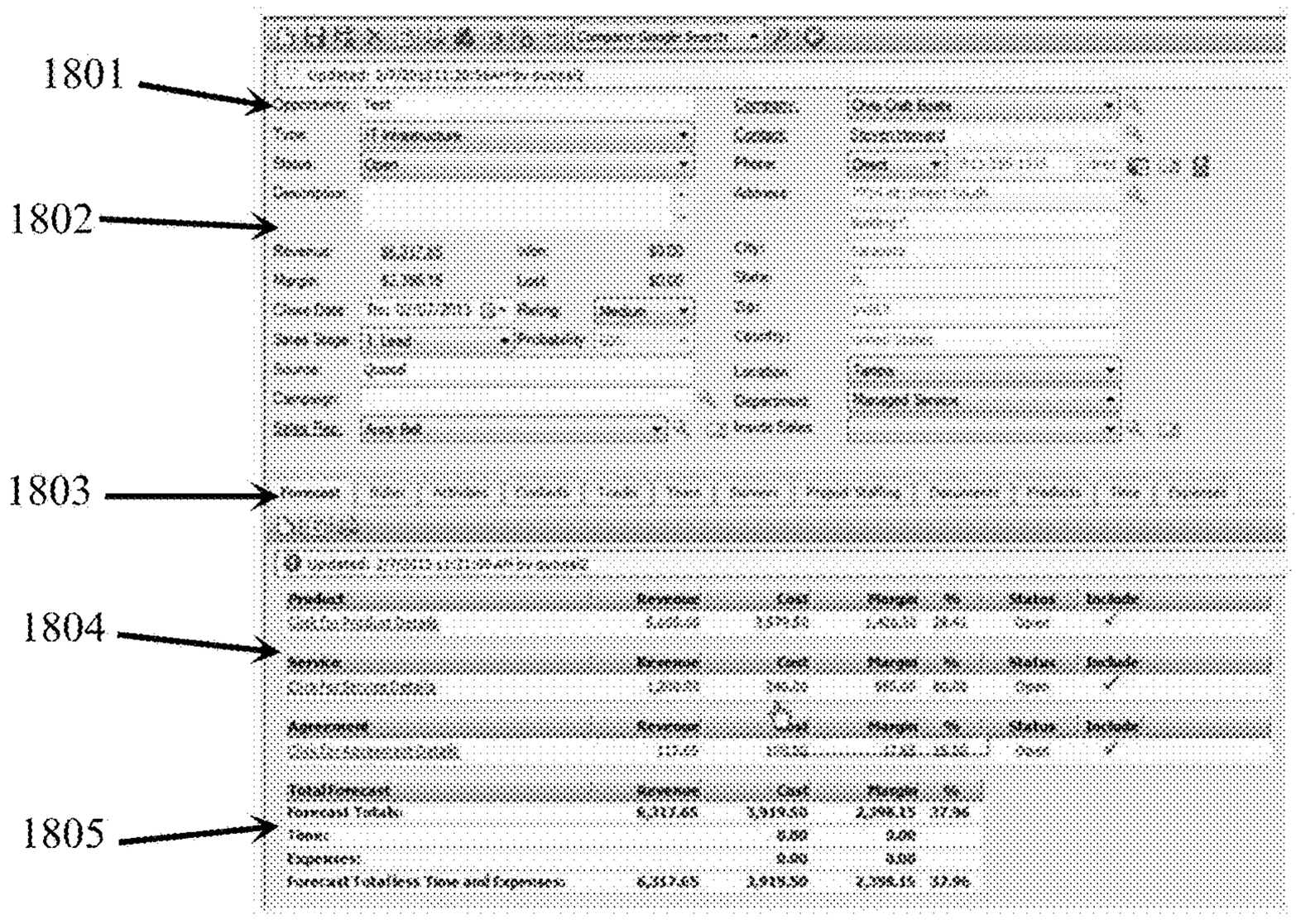

Fig. 18

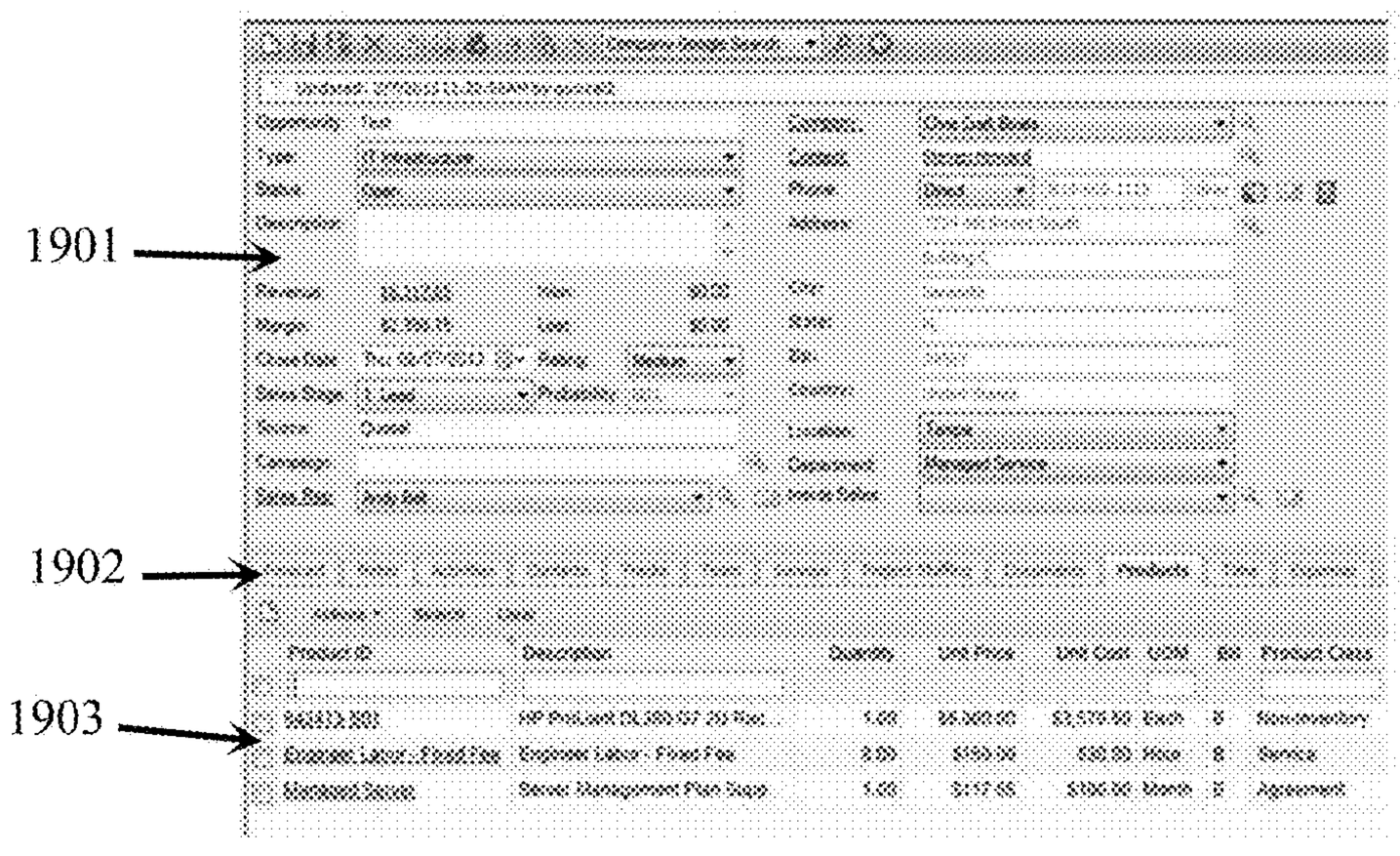

Fig. 19

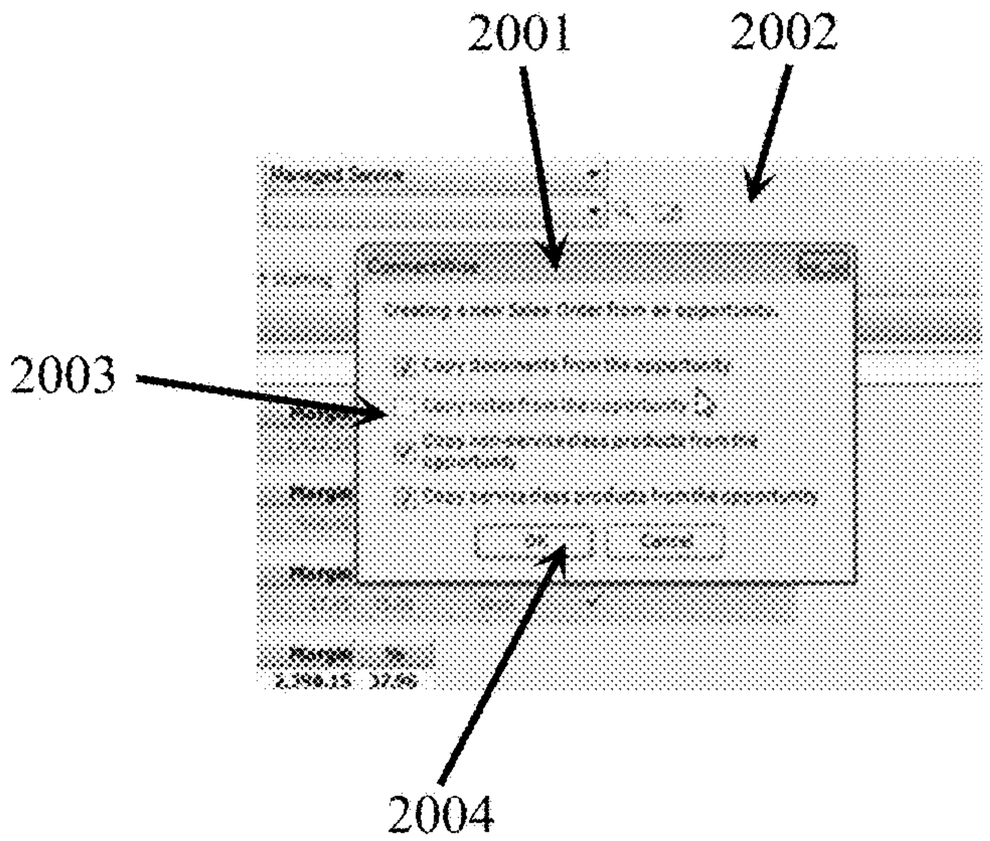

Fig. 20

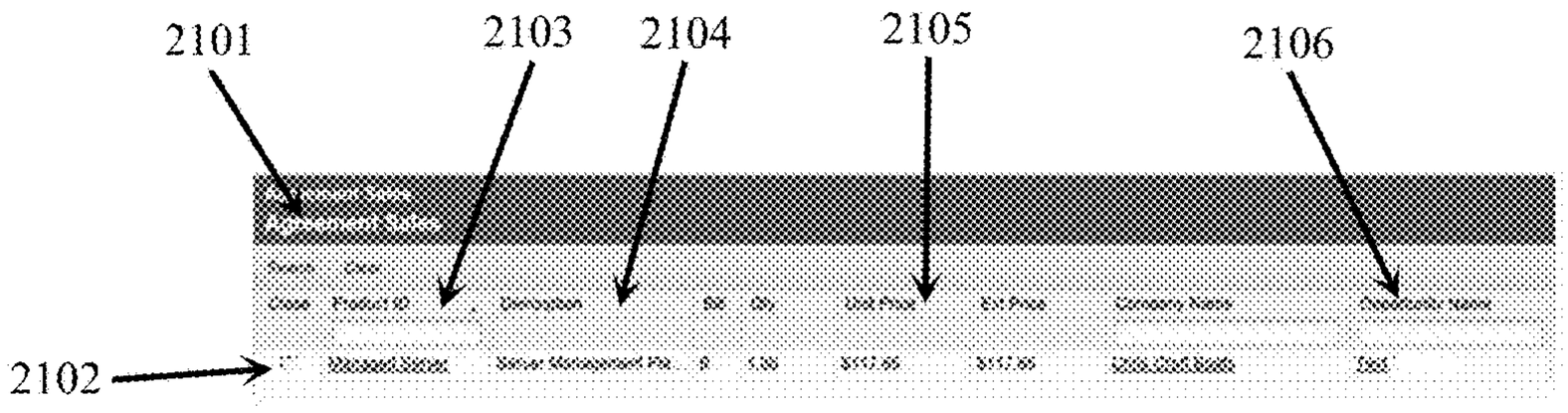

Fig. 21

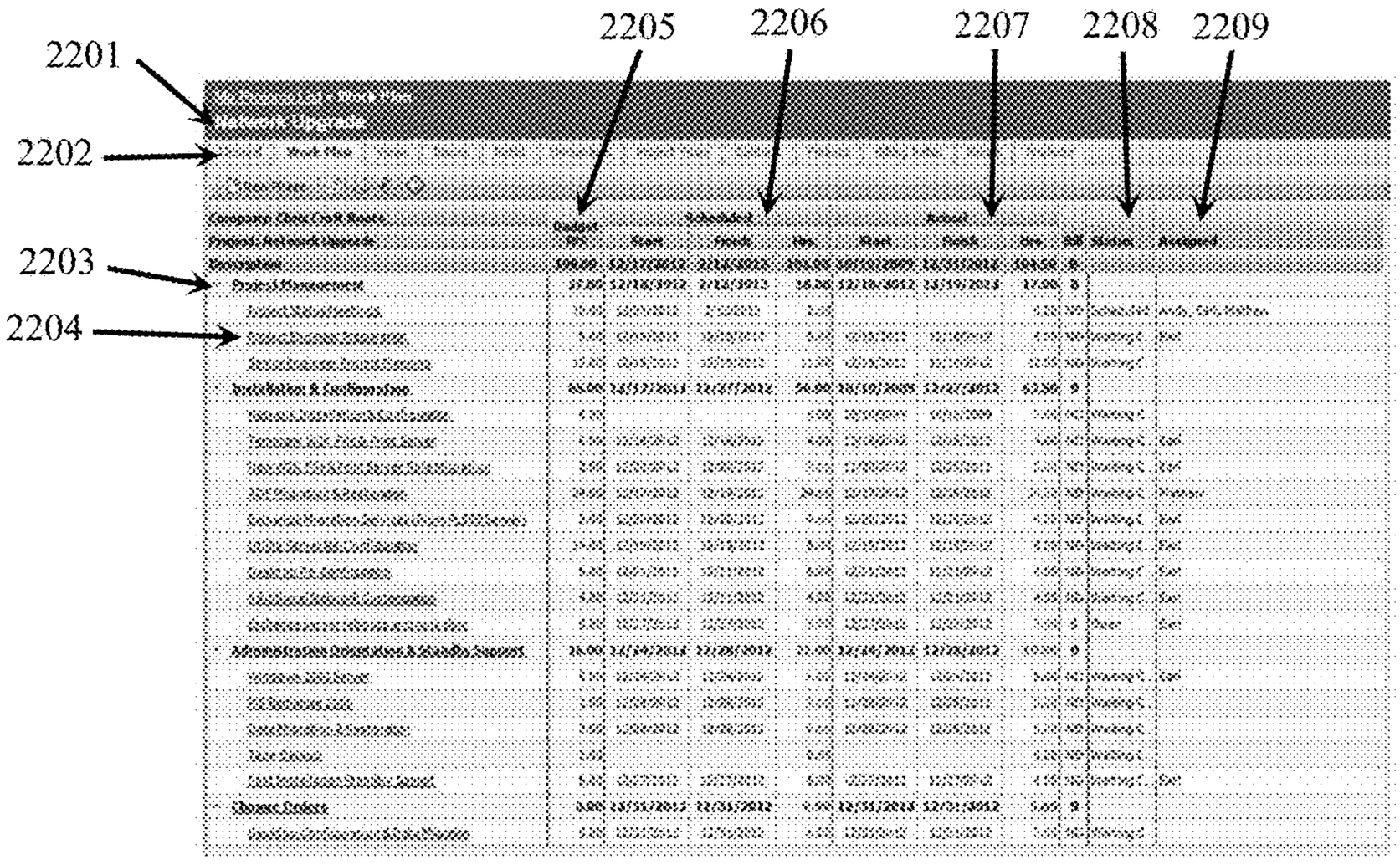

Fig. 22

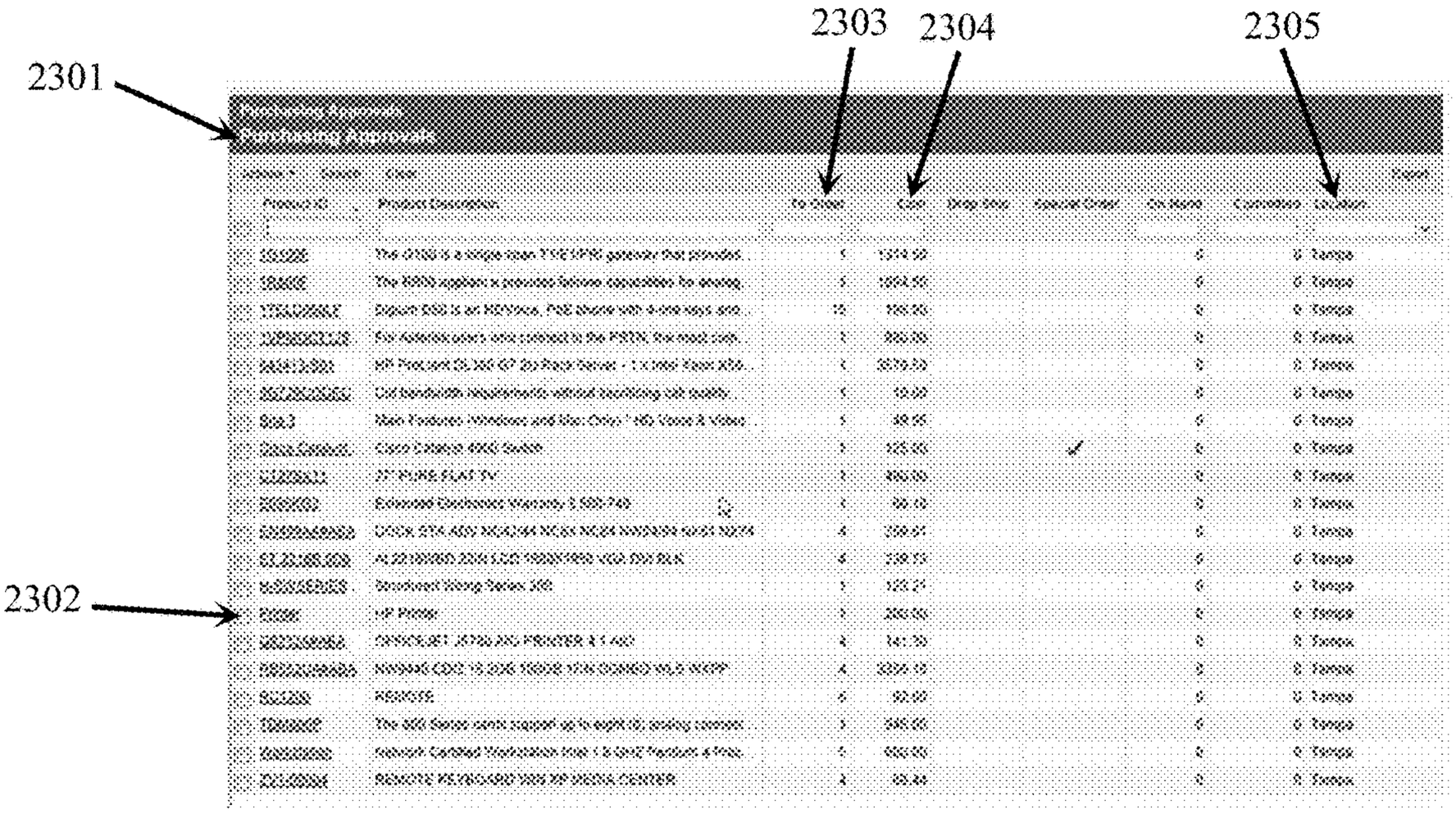

Fig. 23

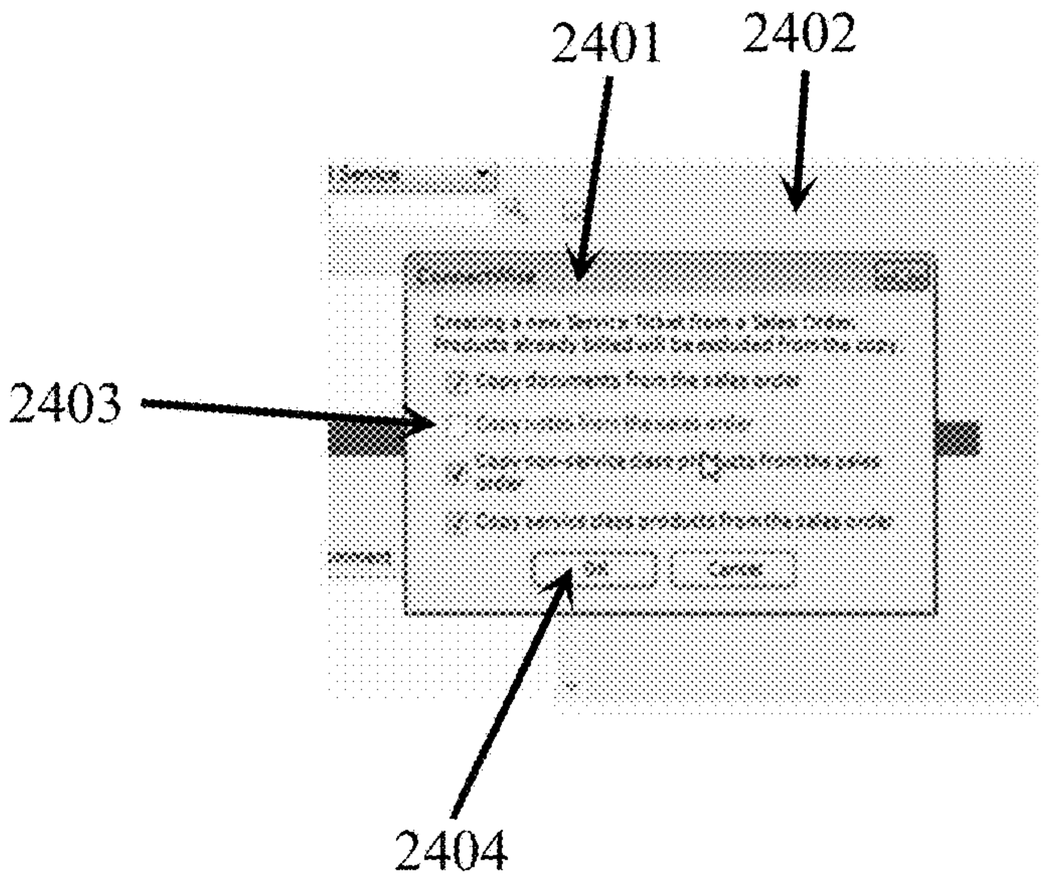

Fig. 24

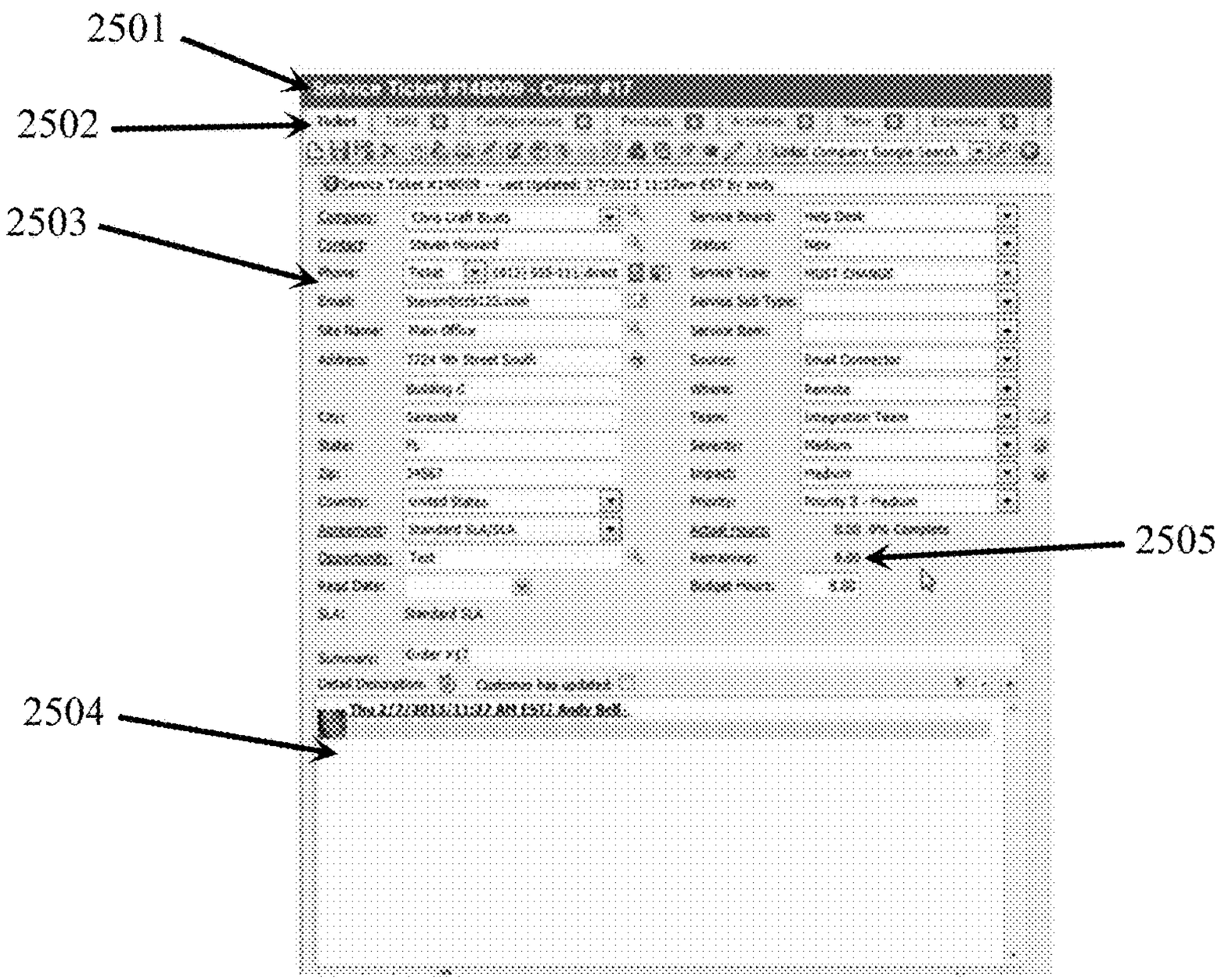

Fig.25

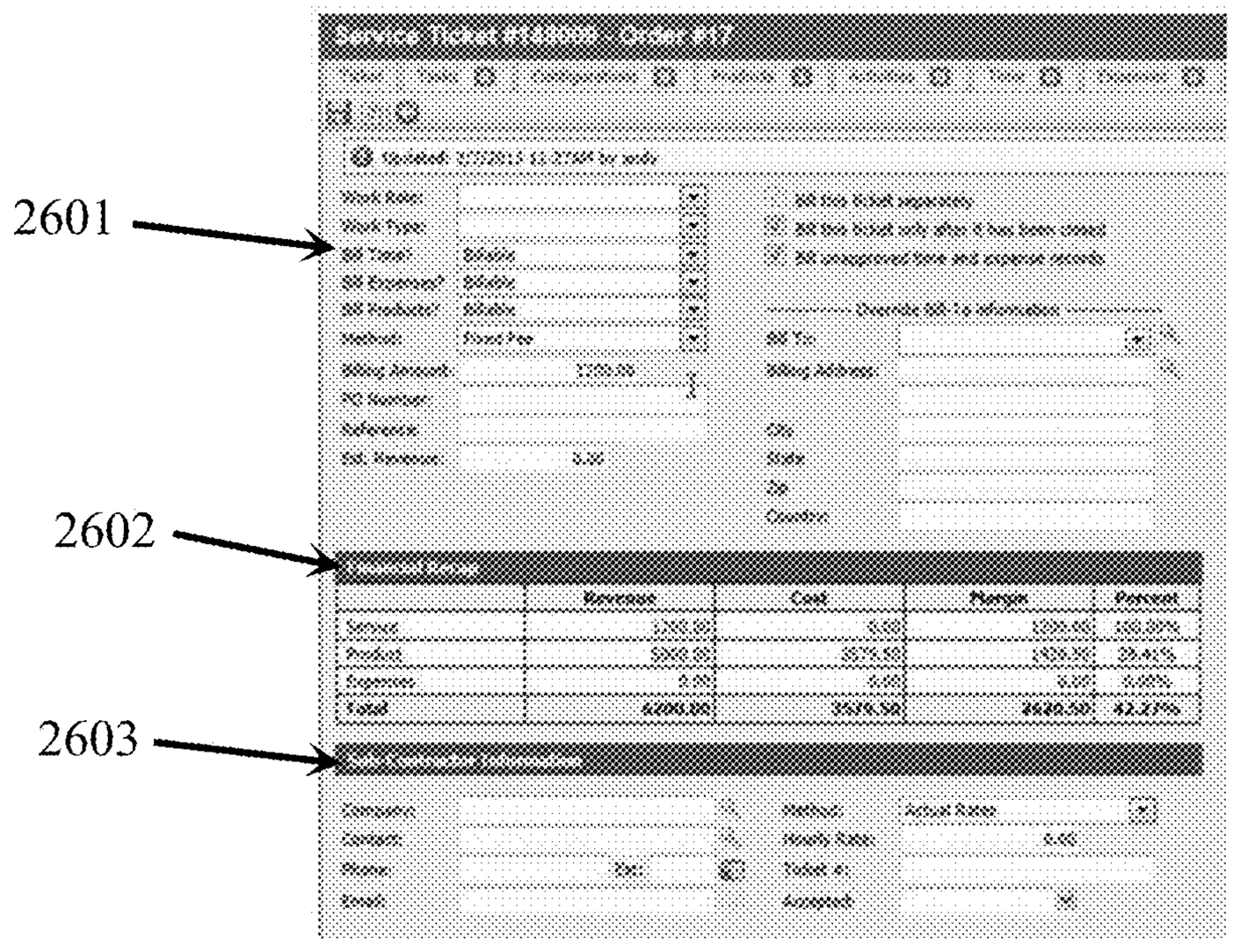

Fig.26

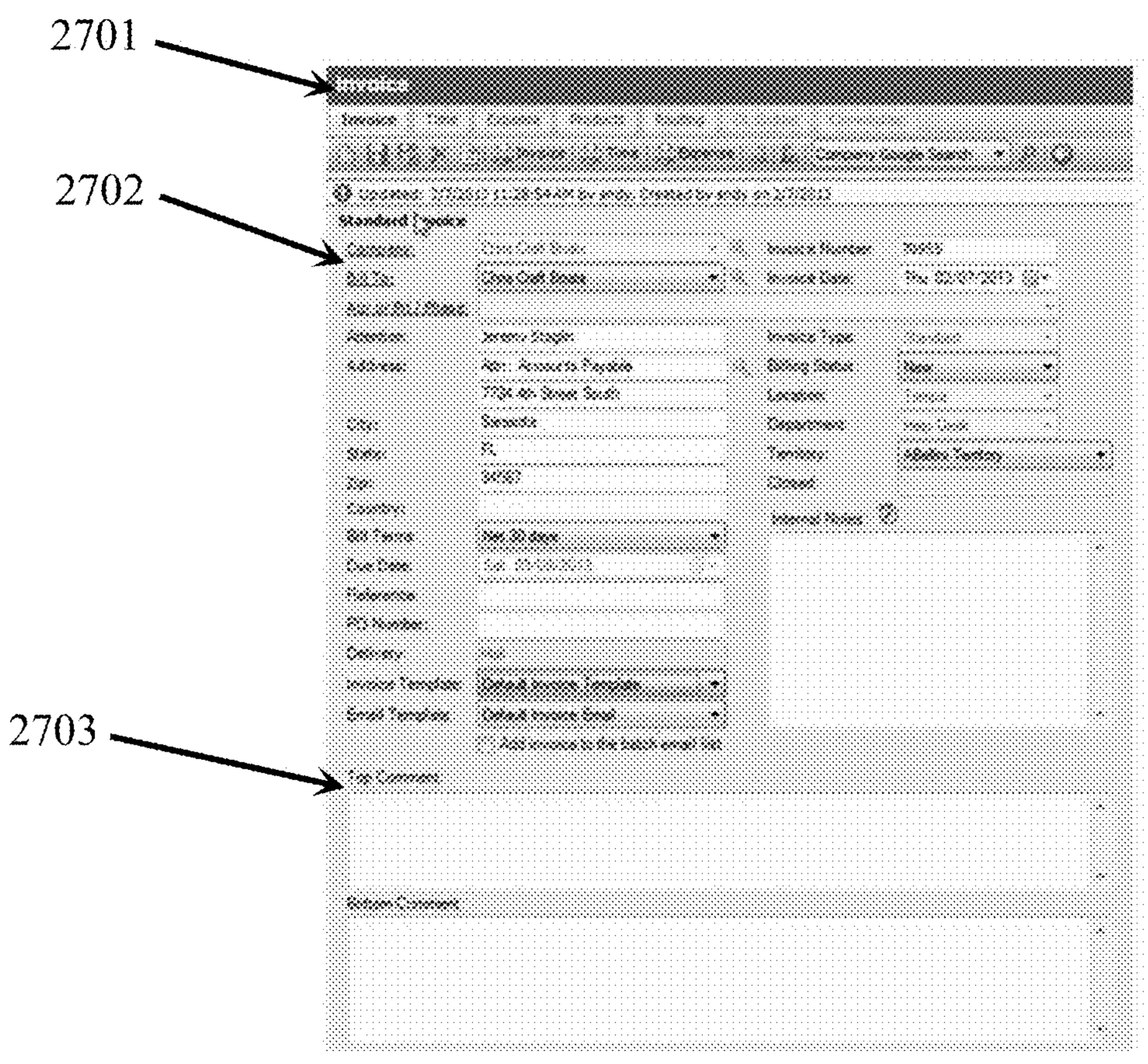

Fig. 27

2801

2802

2803

2804

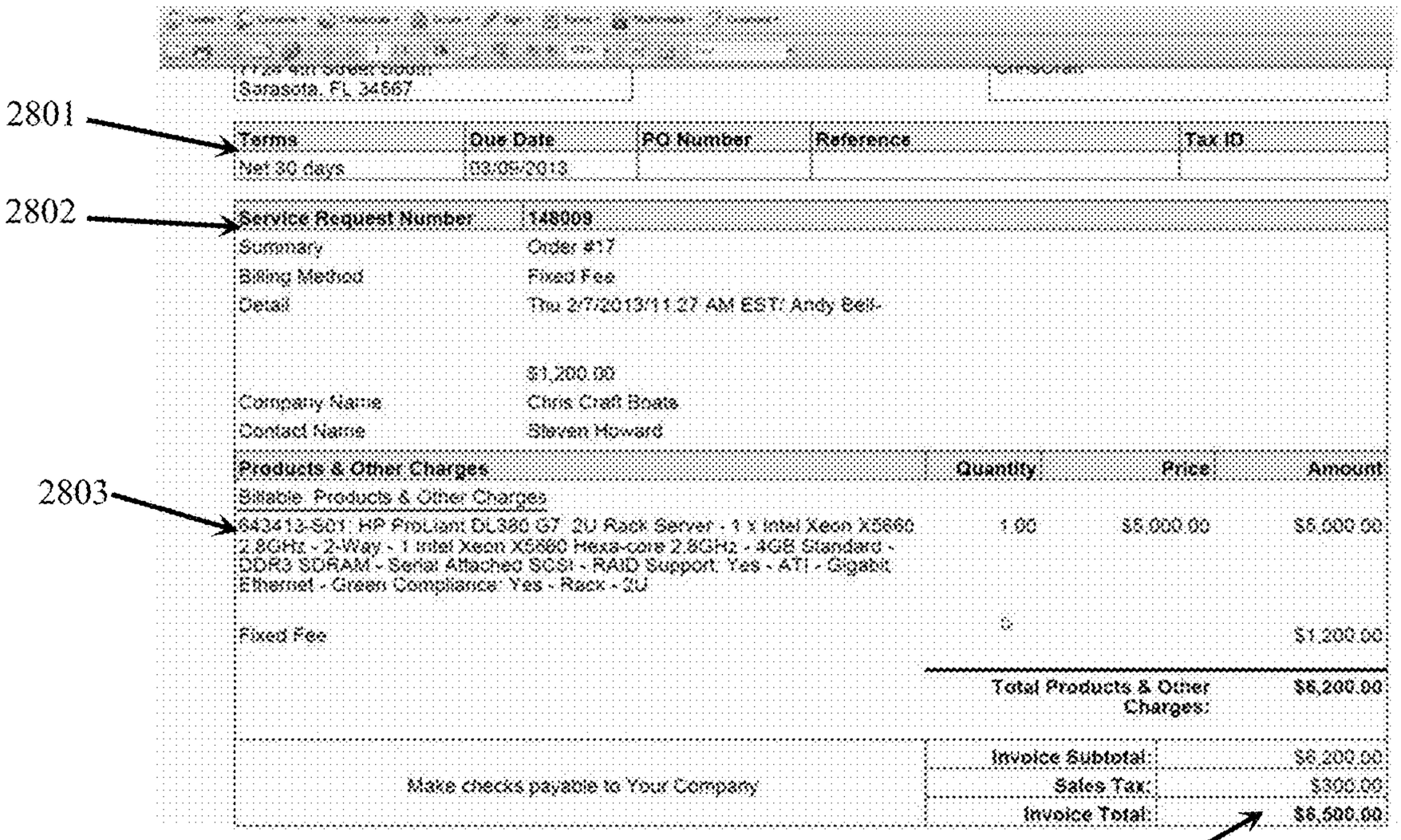

Fig. 28

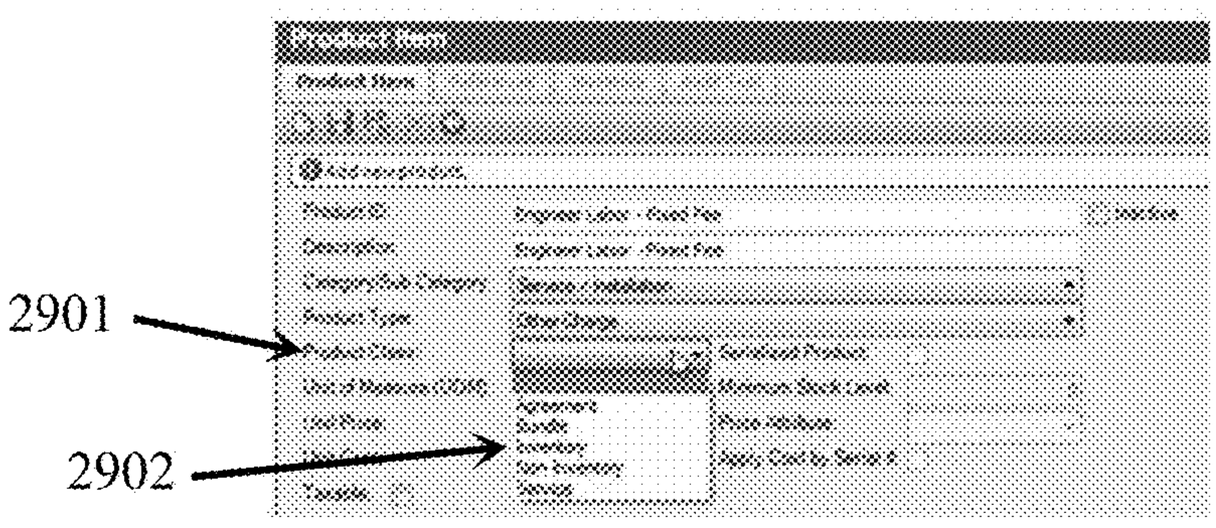

Fig. 29

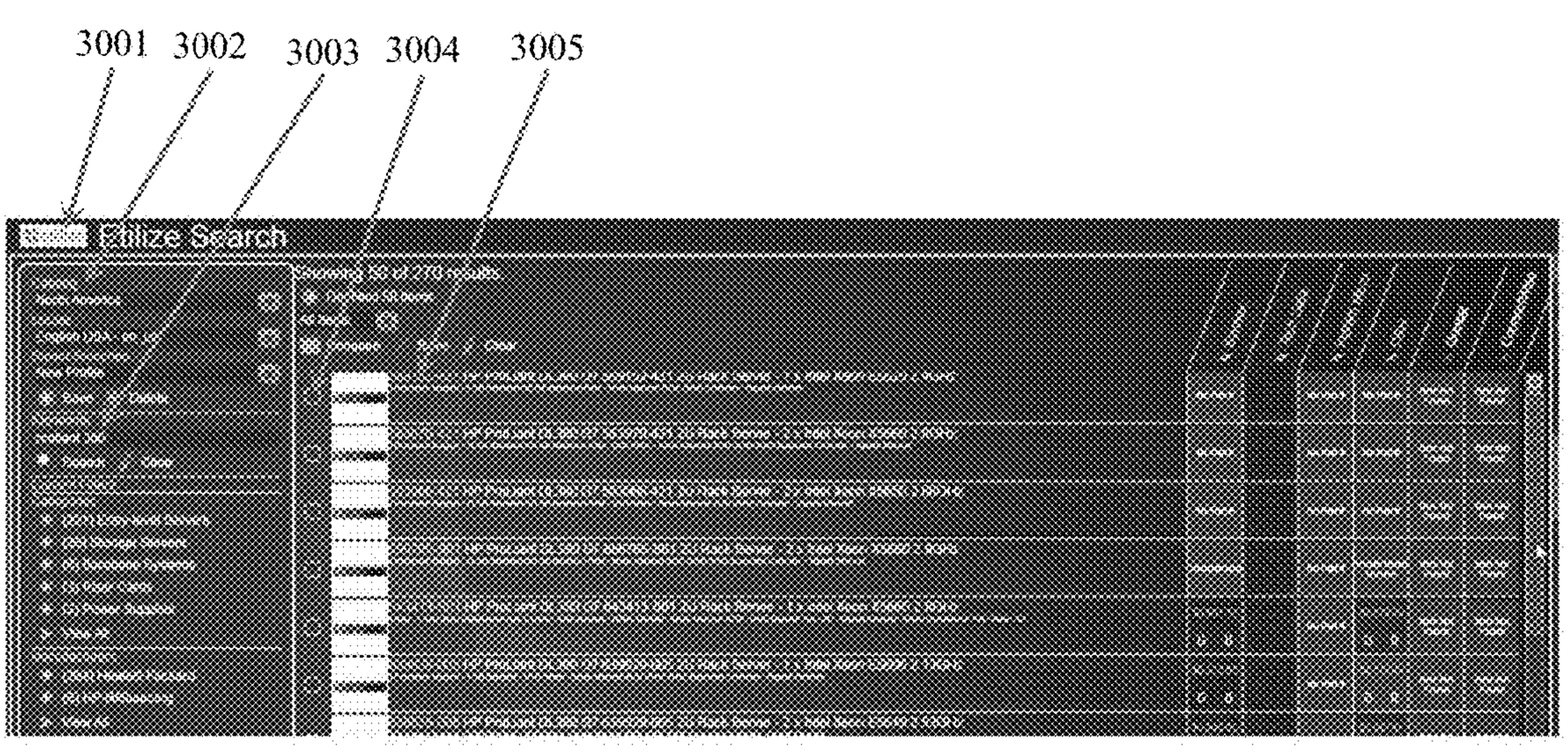

Fig. 30

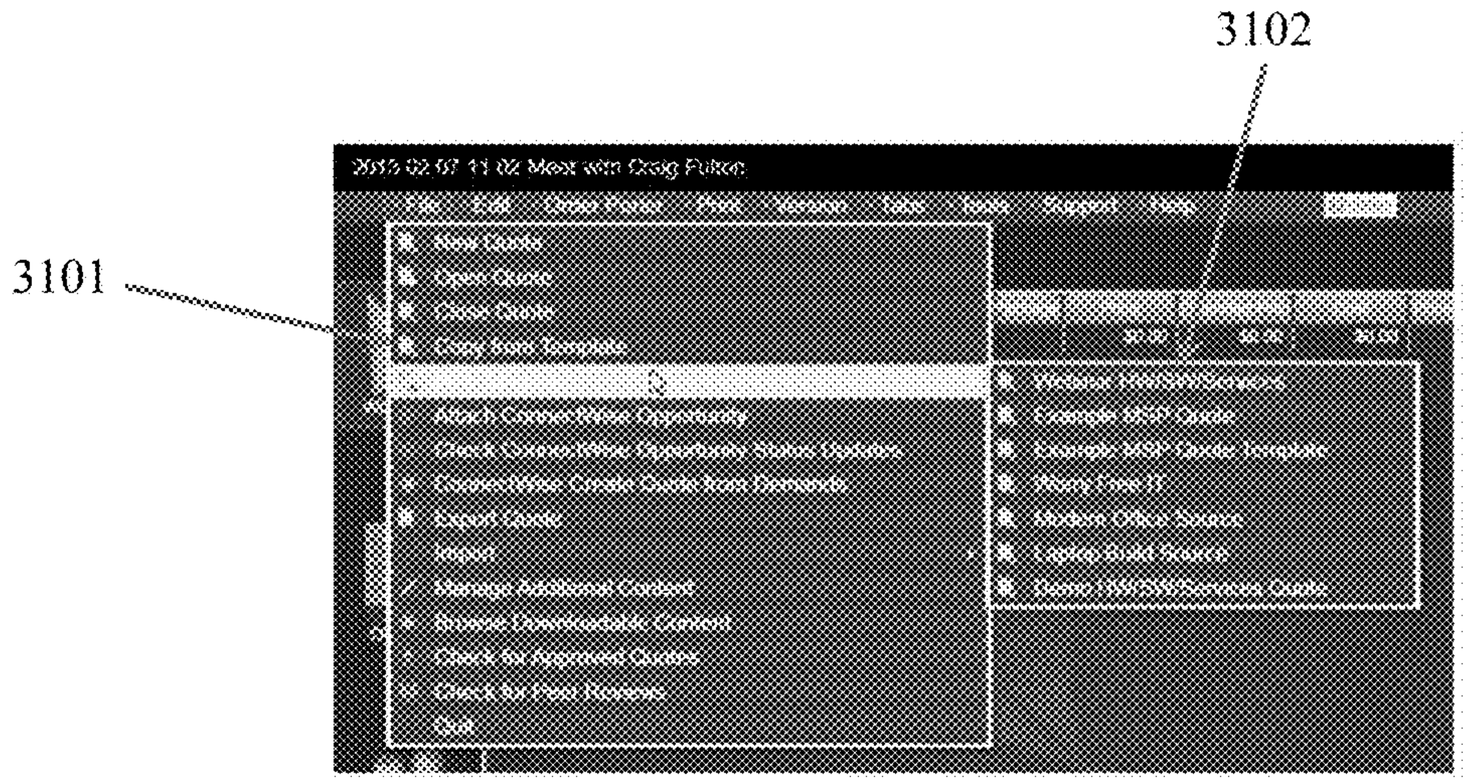

Fig. 31

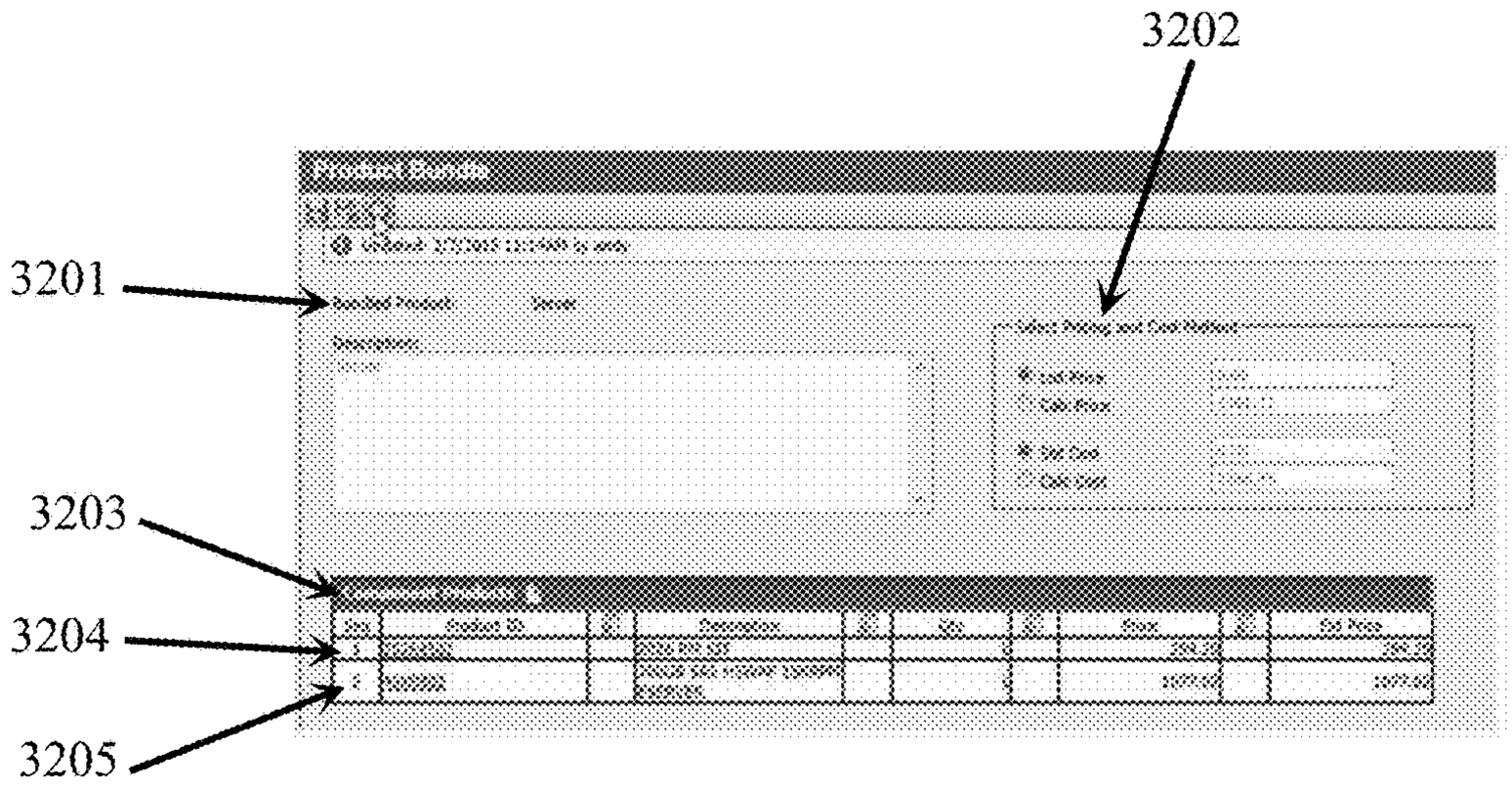

Fig. 32

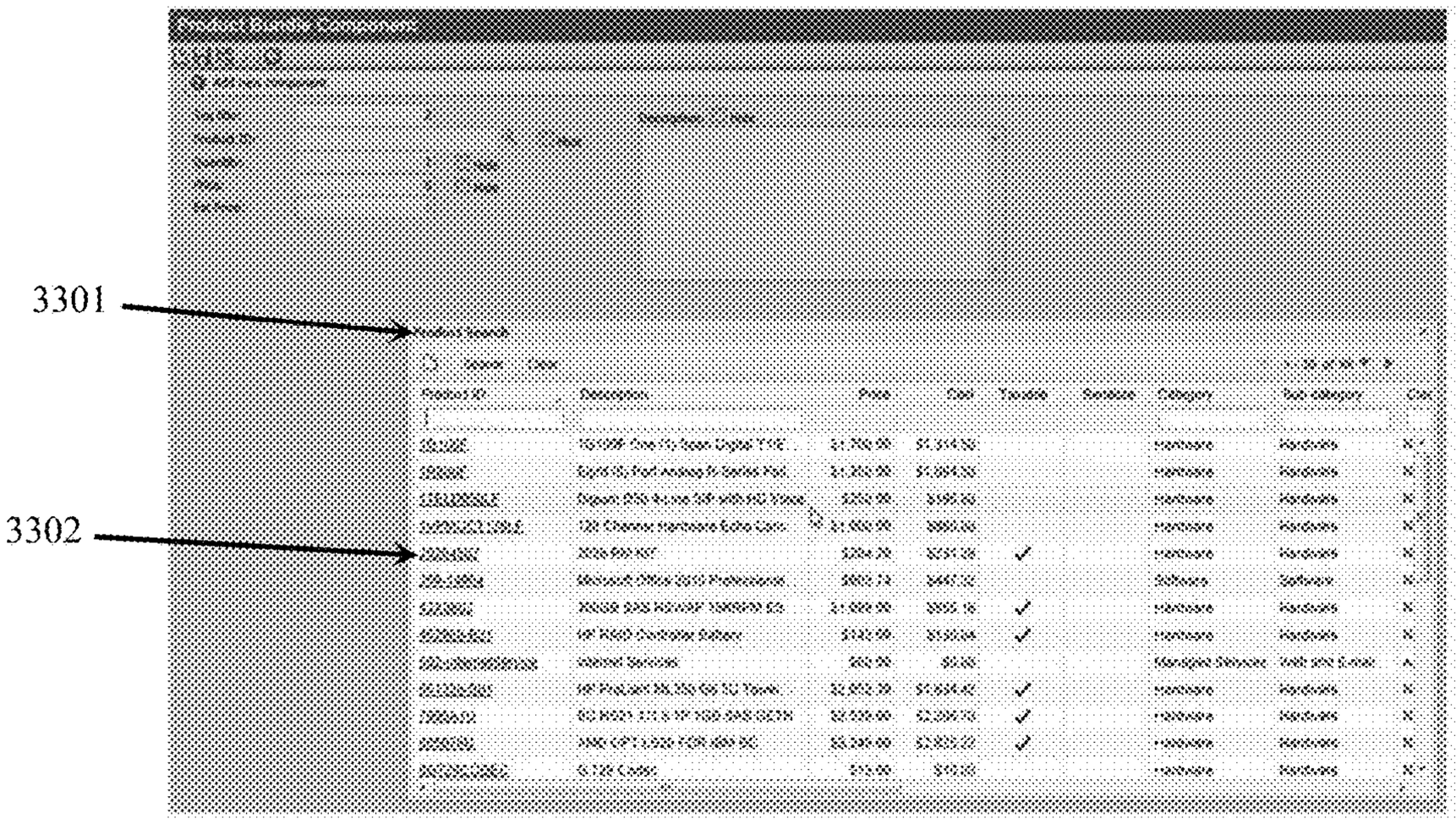

Fig. 33

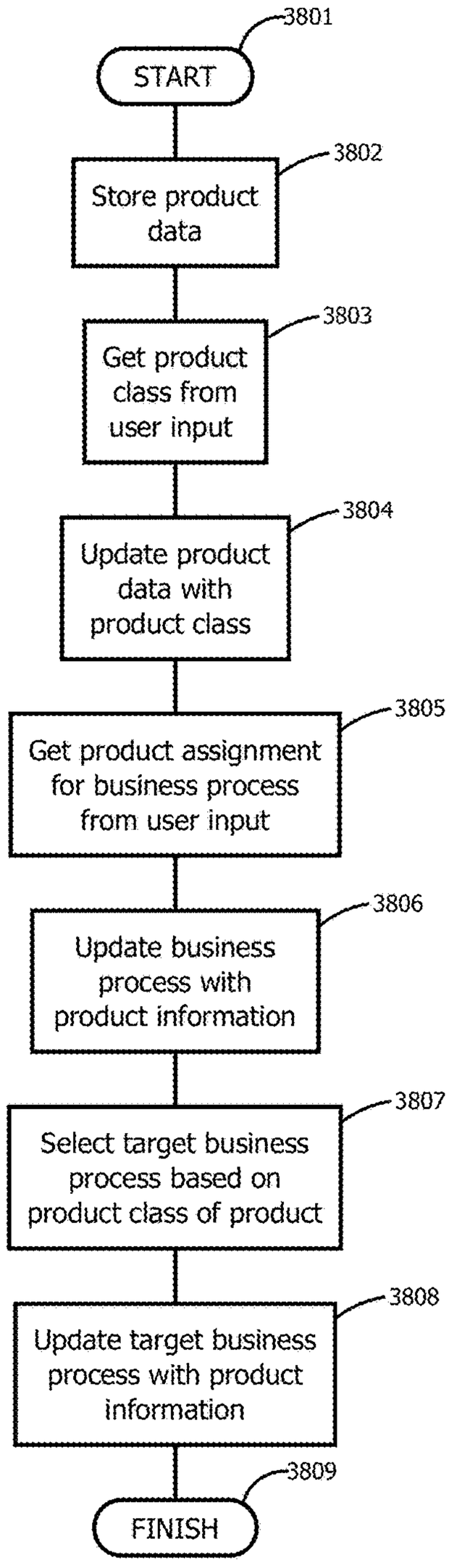
3801
START
3802
Store product data
3803
Get product class from user input
3804
Update product data with product class
3805
Get product assignment for business process from user input
3806
Update business process with product information
3807
Select target business process based on product class of product
3808
Update target business process with product information
3809
FINISH

Fig. 34A

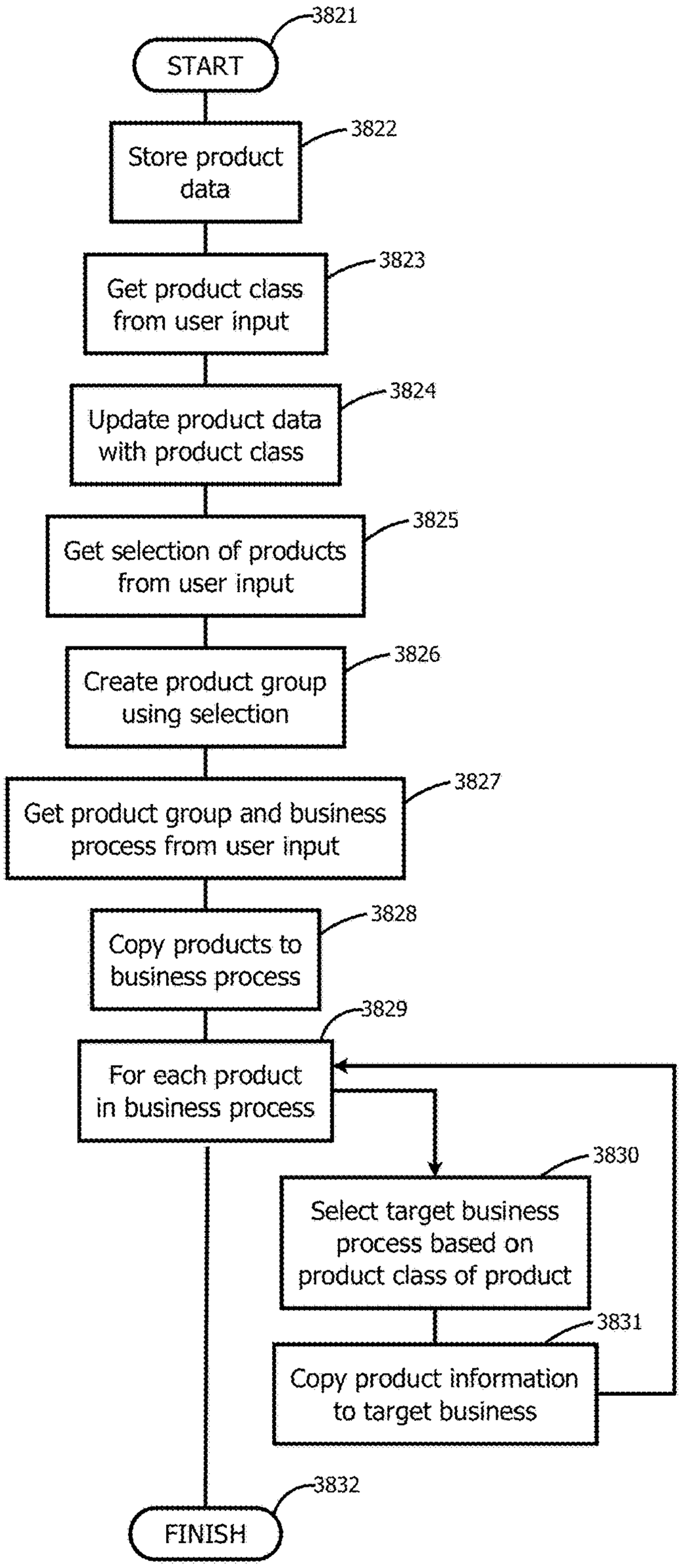
3821
START
3822
Store product data
3823
Get product class from user input
3824
Update product data with product class
3825
Get selection of products from user input
3826
Create product group using selection
3827
Get product group and business process from user input
3828
Copy products to business process
3829
For each product in business process
3830
Select target business process based on product class of product
3831
Copy product information to target business
3832
FINISH

Fig. 34B

SYSTEMS AND METHODS FOR BUSINESS MANAGEMENT USING PRODUCT DATA WITH PRODUCT CLASSES

FIELD OF THE DISCLOSURE

The present disclosure generally relates to the use of resource planning systems to manage and automate business processes. More specifically, the present disclosure relates to using product data to propagate information between multiple business processes within an organization using a resource planning system, based on product classes associated with the product data.

BACKGROUND OF THE INVENTION

Different business units using a resource planning system can interact with each other using a shared data resource that serves as a repository for all of the information used by the system. The structure of the data within the shared data resource can be customized and specialized to the software architecture of the interfaces used by the different business units within the organization. This can make it challenging to customize or modify the data sharing capabilities between the different business units, and can result in a data structure that is challenging for the average end user to work with.

Furthermore, resource planning systems may treat products as single entities. Treating products as single entities may require users of the system to understand the details of multiple, different products, and how the different products work together. In operation, the resource planning system may also disclose information about the products to customers, which may be detrimental to the business organization.

SUMMARY OF THE INVENTION

Systems and methods of the present disclosure facilitate managing a business. For example, the present disclosure provides a product data module that stores product descriptions. The product data module can be configured to associate a product class with a product description, responsive to user input. The present disclosure provides a plurality of business process modules. Responsive to user input, a product description can be associated with a first business process module. Based on the product class of the product that was associated with the first business process modules, the present disclosure can be configured to update a second business process module with the product data from the first business module.

At least one aspect of the present disclosure is directed to a system for managing a business. In some embodiments, the system includes a product data module and a plurality of business process modules. The product data module can be configured to store at least one product description. The product data module can be configured to associate, responsive to a first user, a product class with a first product description. A first business process module can be configured to associate, responsive to a second user, the first product description with the first business process module. The system can be configured to select a second business process module based on the product class, and then update the second business process module with the first product description.

At least one aspect of the present disclosure is directed to a method for managing a business. In some embodiments, the method can include storing, by a product data module executing on at least one processor of a server, at least one product description. In some embodiments, the method can include associating, responsive to a first user, a product class with a first product description. In some embodiments, the method can include associating, responsive to a second user, the first product description with a first of a plurality of business process modules executing on the server. In some embodiments, the method can include selecting, based on the product class, a second business process module. In some embodiments, the method can include updating the second business process module with the first product description.

At least one aspect is directed to a system for managing a business. In some embodiments, the system can include a product data module and a plurality of business process modules executing on at least one processor of a server. In some embodiments, the at least one processor is configured to store a first product description of a first product in the product data module. The first product description can be in a format associated with a first business process module. The processor can store the first product description in a memory communicatively coupled to the at least one processor. The at least one processor can identify a product class that includes at least one of a labor product, a parts product, and an agreements product. The product class can be identified based on the first product description. The at least one processor can select, based on the product class, a second business process module. The second business process module can be configured to interface with the product data module. The at least one processor can transmit, to the selected second business process module, the first product description of the first product. The at least one processor can control the second business module to execute a second business process based on at least one of the first product description and the product class.

At least one aspect of the present disclosure is directed to a system for grouping products. In some embodiments, the system includes a product data module and at least one business process module. The product data module can be configured to store a first plurality of product descriptions. The product data module can be configured to associate, responsive to a first user, a product class with at least one of the first plurality of product descriptions. The product data module can be configured to select, responsive to a second user, a second plurality of product descriptions. The system can be configured to associate, responsive to a third user, the second plurality of product descriptions with a first business process module. The system can be configured to select, based on the product class associated with a second product description in the second plurality of product descriptions, a second business process module, and then update the second business process module with the second product description.

At least one aspect of the present disclosure is directed to a method for grouping products. In some embodiments, the method can include storing, by a product data module executing on at least one processor of a server, at least one product description. In some embodiments, the method can include associating, responsive to a first user, a product class with a first of the product descriptions. In some embodiments, the method can include selecting, responsive to a second user, a second plurality of product descriptions from the product data module. In some embodiments, the method can include associating, responsive to a third user, the second plurality of product descriptions with a first of a plurality of business process modules executing on the server. In some embodiments, the method can include select-

ing, based on the product class associated with a second process description in the second plurality of product descriptions, a second business process module. In some embodiments, the method can include updating the second business process module with the second product description.

At least one aspect of the present disclosure is directed to a non-transitory computer readable storage medium that includes instructions to manage a business via a product data module and a plurality of business process modules. In some embodiments, the instructions can include instructions to store, in a memory a first product description of a first product in the product data module. The first product description can be in a format associated with a first business process module. The instructions can include instructions to identify, based on the first product description, a product class. The product class can include at least one of a labor product, a parts product, and an agreements product. The instructions can include instructions to select, based on the product class, a second business process module. The second business process module can interface with the product data module. The instructions can include instructions to transmit, to the selected second business process module, the first product description of the first product. The instructions can include instructions to control the second business module to execute a second business process based on at least one of the first product description and the product class.

BRIEF DESCRIPTION OF THE DRAWINGS

The details of one or more implementations of the subject matter described in this specification are set forth in the accompanying drawings and the description below. Other features, aspects, and advantages of the subject matter will become apparent from the description, the drawings, and the claims.

FIG. **1**A is an illustrative block diagram of an embodiment of a system to manage a business.

FIG. **1**B is an illustrative block diagram of an embodiment of a system to group products.

FIG. **2** is an illustrative block diagram of an embodiment of a service provider.

FIG. **3** is an illustrative block diagram of an embodiment of the business units and processes within a service provider.

FIGS. **4**A-H are illustrative block diagrams of embodiments of the relationships between the business units and the processes within a service provider.

FIG. **5** is an illustrative block diagram of an embodiment of product data.

FIG. **6** is an illustrative block diagram of an embodiment of the data flow within a service provider.

FIGS. **7**A-C are illustrative block diagrams of embodiments of the flow of information from product data to the business processes within a service provider.

FIG. **8** is an illustrative block diagram of an embodiment of reliable synchronization of the quote and invoice seen by a customer.

FIG. **9** is an illustrative block diagram of an embodiment of interfaces between product data and external systems.

FIG. **10** is an illustrative block diagram of an embodiment of templates for product data.

FIG. **11** is an illustrative block diagram of an embodiment of bundles for product data.

FIG. **12** is an illustrative example of an embodiment of a user interface for overall access to a resource planning system.

FIG. **13** is an illustrative example of an embodiment of a user interface for displaying and modifying product data.

FIG. **14** is an illustrative example of an embodiment of a user interface for displaying and modifying a single item of product data.

FIG. **15** is an illustrative example of an embodiment of a user interface for displaying and modifying a quote for a customer.

FIG. **16** is an illustrative example of an embodiment of a quote for a customer.

FIG. **17** is an illustrative example of an embodiment of a user interface for sales management.

FIG. **18** is an illustrative example of an embodiment of a user interface for managing a single sales opportunity.

FIG. **19** is an illustrative example of an embodiment of a user interface for managing the products associated with a single sales opportunity.

FIG. **20** is an illustrative example of an embodiment of a user interface for creating a sales order from a sales opportunity that was won.

FIG. **21** is an illustrative example of an embodiment of a user interface for displaying and modifying agreements.

FIG. **22** is an illustrative example of an embodiment of a user interface for project management.

FIG. **23** is an illustrative example of an embodiment of a user interface for managing procurement.

FIG. **24** is an illustrative example of an embodiment of a user interface for creating a service ticket from a sales order.

FIG. **25** is an illustrative example of an embodiment of a user interface for displaying and modifying a service ticket.

FIG. **26** is an illustrative example of an embodiment of a user interface for displaying and modifying the financial aspects of a service ticket.

FIG. **27** is an illustrative example of an embodiment of a user interface for displaying and modifying an invoice for a customer.

FIG. **28** is an illustrative example of an embodiment of an invoice for a customer.

FIG. **29** is an illustrative example of an embodiment of classes for product data.

FIG. **30** is an illustrative example of an embodiment of a user interface for interfacing product data to an external product data source.

FIG. **31** is an illustrative example of an embodiment of a user interface for selecting a product template.

FIG. **32** is an illustrative example of an embodiment of a user interface for displaying and modifying a product bundle.

FIG. **33** is an illustrative example of an embodiment of a user interface for selecting products to include in a product bundle.

FIG. **34**A is an illustrative flowchart depicting one embodiment of the steps taken to manage a business.

FIG. **34**B is an illustrative flowchart depicting one embodiment of the steps taken to group products.

Like reference numbers and designations in the various drawings indicate like elements.

DETAILED DESCRIPTION

Systems and methods of the present disclosure allow a resource planning system to manage and automate business processes using a single, unifying product data format to convey product information to/from various business processes. In some embodiments, systems and methods of the present disclosure facilitate the operation of the resource planning system by grouping multiple products. The product

data format can include various classes or sub-classes of products, including, e.g., labor, parts and agreements. In an illustrative example, a marketing department can use a quoting business process to create a quote for installing a new networking solution. This quote can include product data such as labor products (e.g., man-hours to install and setup equipment, train office personnel), parts products (e.g., routers, cables, firewall server), and agreements products (e.g., warranty, on-going maintenance agreement). Accordingly, the resource planning system can interpret the quote as a product, and convey this product data to a sales process which can sell the product to a customer. For example, the sales process can refer to the elements of the product data (e.g., the quote) to complete a sale, where a sale is complete upon the customer agreeing to each element of the product (e.g., labor terms, parts terms, and agreement terms). Once a customer agrees to the elements of a quote, the system can convert the quote product data into a sales product data because the product has been sold. The sale product data can include the elements of the quote product data and be in the same format. Furthermore, other modules of the resource planning system can use the product data to facilitate various processes. For example, a sales order module can use the sale product data, which can match the quote product data, to make the corresponding purchases on behalf of the customer.

FIG. **1**A illustrates a block diagram of a system to manage a business. The business is a service provider **201** with a resource planning system **204**. The resource planning system **204** has a product data module **301** that stores product information **101**, with both a product description **102** and a product class **103**. A staff member **202***a* uses a device **203***a* to update the product class **203** to match the product **101**. The resource planning system **204** also has a number of business process modules **303**. Another staff member **202***b* uses a device **203***b* to select a product **102***a* and associate it with a product **102***b* in a business process module **303***x*. The system then uses the product class **103** to select a second business process module **303***y*, and transfers the product information from the product **102***b* in the first business process module **303***x* to a product **102***c* in the second business process module **303***y*. The product class **103** of the product information **102***b* in the first business process module **303***x* can indicate how the product can affect the other business process modules **303** in the system, and therefore can indicate the selection of the second business process module **303***y*. In one embodiment, later described more completely with respect to FIG. **7**, the same selection of the second business process module **303***y* is made for a given value of the product class **103**. For example, if the product class **103** indicates that the product is a labor product, the second business process module **303***y* can be selected from at least one of a quoting process **303***a*, a delivery and setup process **303***d*, a project planning process **303***e*, an invoicing and collection process **303***f*, or a contract management process **303***h*. In another example, if the product class **103** indicates that the product is a parts product, the second business process module **303***y* can be selected from at least one of a quoting process **303***a*, a procurement process **303***c*, a delivery and setup process **303***d*, a project planning process **303***e*, an invoicing and collection process **303***f*, or a payables process **303***g*. In still another example, if the product class **103** indicates that the product is an agreements product, the second business process module **303***y* can be selected from at least one of a quoting process **303***a*, an invoicing and collection process **303***f*, a contract management process **303***h*, or a maintenance process **303***i*.

FIG. **1**B illustrates a block diagram of a system to group products. A service provider **201** uses a resource planning system **204** that contains a product data module **301** that stores a set of product descriptions **102**. A user **202***a* can use a device **203***a* to interact with the system **204** and associate a product class **103** with each product description **102** to make a product **1010**. Another user **202***b* can use a device **203***b* to interact with the system **204** to create a group of products **1001**. The group **1001** represents an arbitrary collection of the products from the product data module **301**. For example, the embodiment illustrated in FIG. **1**B has a group **1001** with product 1 **1002***a* through product k **1002***k*, representing a group of different products **1010** from the product data module **301**.

The group of products **1001** now makes it much simpler for a third user **202***c* to use the related group of products created by the second user **202***b* in the business process modules **303** of the system **201**. In the embodiment illustrated in FIG. **1**B, the third user **202***c* uses a device **203***c* to interact with the system **204** and select the group **1001** for use by the business process module 1 **303***x*. The products **1010** identified by the group **1001** are copied into the business process module 1 **303***x* where they are stored **102***b*-**102***d*.

At some later time, triggered either manually or automatically, the system copies the products from business process module 1 **303***x* to other business process modules **303**, based on the product class **103** assigned to the products. For example, in the embodiment illustrated in FIG. **1**B, the class for product 1 **1010***a* indicates that the product data **102***b* needs to be copied to business process module 2 **303***y*, creating the copy **102***d* of the product. At the same time, the class for product 2 **1010***b* indicates that the product data **102***c* needs to be copied to business process module j **303***z*, creating the copy **102***e* of the product.

According to various embodiments, the processes described herein can be implemented by the system or hardware components in response to the one or more processors executing an arrangement of instructions contained in memory. Such instructions can be read into memory from another computer-readable medium, such as a storage device. Execution of the arrangement of instructions contained in memory causes the system to perform the illustrative processes described herein. One or more processors in a multi-processing arrangement may also be employed to execute the instructions contained in memory. In alternative embodiments, hard-wired circuitry may be used in place of or in combination with software instructions to effect illustrative embodiments. Thus, embodiments are not limited to any specific combination of hardware circuitry and software.

To provide for interaction with a user, embodiments of the subject matter described in this specification can be implemented on a computer having a display device, e.g., a CRT (cathode ray tube) or LCD (liquid crystal display) monitor, for displaying information to the user and a keyboard and a pointing device, e.g., a mouse or a trackball, by which the user can provide input to the computer. Other kinds of devices can be used to provide for interaction with a user as well; for example, feedback provided to the user can be any form of sensory feedback, e.g., visual feedback, auditory feedback, or tactile feedback; and input from the user can be received in any form, including acoustic, speech, or tactile input.

FIG. **2** illustrates a block diagram of a service provider **201** in accordance with an embodiment. The service provider **201** provides goods and services to customers **206**. In one embodiment, the service provider **201** is an information

technology (IT) service company that provides computer software, hardware, and maintenance to its customers **206**. In another embodiment, the service provider **201** is a software product developer that provides the same software application to many different customers **206**. In another embodiment, the service provider **201** is a custom software developer that provides different software applications, customized for specific needs, to each customer **206**. In another embodiment, the service provider **201** is a web development company that provides the design and implementation of web sites to its customers **206**. In another embodiment, the service provider **201** is a managed service provider (MSP) that services the computer hardware and software of its customers **206** for a fee (e.g., a fixed fee). In another embodiment, the service provider **201** is a hardware reseller that provides its customers **206** with computer hardware, installation, and setup. These embodiments are intended to be illustrative rather than limiting, and in still other embodiments, the service provider **201** provides its customers **206** with various combinations of the services described in these embodiments.

The service provider **201** employs a staff **202** to provide the services described. To support their work, the staff **202** uses one or more resource planning systems **204**, accessing the resource planning systems **204** with devices **203**. Devices **203** may be connected to the resource planning systems **204** either directly or through a network. In one embodiment, the resource planning systems **204** run internally at the service provider **201**. In another embodiment, the resource planning systems **204** run externally, outside the service provider **201**. In other embodiments, the resource planning systems **204** are a mixture of internal and external systems.

The network can include a local-area network (LAN), such as a company Intranet, a metropolitan area network (MAN), or a wide area network (WAN), such as the Internet or the World Wide Web. In some embodiments, there are multiple networks between the devices and the servers. In one of these embodiments, the network may be a public network, a private network, or may include combinations of public and private networks.

The network may be any type or form of network and may include any of the following: a point-to-point network, a broadcast network, a wide area network, a local area network, a telecommunications network, a data communication network, a computer network, an ATM (Asynchronous Transfer Mode) network, a SONET (Synchronous Optical Network) network, a SDH (Synchronous Digital Hierarchy) network, a wireless network and a wireline network. In some embodiments, the network may include a wireless link, such as an infrared channel or satellite band. The topology of the network may include a bus, star, or ring network topology. The network may include mobile telephone networks utilizing any protocol or protocols used to communicate among mobile devices, including advanced mobile phone protocol ("AMPS"), time division multiple access ("TDMA"), code-division multiple access ("CDMA"), global system for mobile communication ("GSM"), general packet radio services ("GPRS") or universal mobile telecommunications system ("UMTS"). In some embodiments, different types of data may be transmitted via different protocols. In other embodiments, the same types of data may be transmitted via different protocols.

The service provider interacts with vendors **205**, which can include one or more of hardware vendors that supply physical hardware, software vendors that supply software applications, and service vendors that supply other services. In one embodiment, a vendor **205** is also a service provider, such as the service provider **201**.

The one or more servers associated with the resource planning systems **204** or service provider devices **203** do not need to be physically proximate to each other or in the same machine farm. Thus, the servers logically grouped as a machine farm may be interconnected using a wide-area network (WAN) connection or a metropolitan-area network (MAN) connection. For example, a machine farm may include servers physically located in different continents or different regions of a continent, country, state, city, campus, or room. Data transmission speeds between servers in the machine farm can be increased if the servers are connected using a local-area network (LAN) connection or some form of direct connection.

Management of the servers may be de-centralized. For example, one or more servers may comprise components, subsystems and circuits to support one or more management services. In one of these embodiments, one or more servers provide functionality for management of dynamic data, including techniques for handling failover, data replication, and increasing robustness. Each server may communicate with a persistent store and, in some embodiments, with a dynamic store.

A server may include a file server, application server, web server, proxy server, appliance, network appliance, gateway, gateway, gateway server, virtualization server, deployment server, secure sockets layer virtual private network ("SSL VPN") server, or firewall.

In one embodiment, the server may be referred to as a remote machine or a node.

FIG. **3** illustrates a block diagram of the business units **302** and business processes **303** within a service provider **201** in accordance with an embodiment. The staff **202** at the service provider **201** is organized into different business units **302**. In one embodiment, the business units **302** can include at least one of the marketing/sales department **302***a*, the project management department **302***b*, the purchasing department **302***c*, the engineering department **302***d*, the accounting department **302***e*, the legal department **302***f*, the support department **302***g*, and the corporate management **302***h*. In some embodiments, such as smaller companies, a single staff member **202** is a member of more than one department **302**. In other embodiments, there are different business units; the embodiment described is intended to be illustrative rather than limiting.

The marketing/sales department **302***a* is responsible for finding customers **206** and convincing the customers **206** to do business with the service provider **201**. The project management department **302***b* is responsible for understanding the needs of customers **206** and providing detailed plans to the staff **202** to meet those needs. The purchasing department **302***c* is responsible for interacting with vendors **205** to procure and pay for goods and services provided by the vendors **205**. The engineering department **302***d* is responsible for the technical operations of installing, setting up, and maintaining the goods and services provided to the customers **206**. The accounting department **302***e* is responsible for managing all of the financial aspects of the service provider **201**. The legal department **302***f* is responsible for agreements between the service provider **201** and customers **206**, agreements between the service provider **201** and vendors **205**, and any other legal issues involving the service provider **201**. The support department **302***g* is responsible for helping customers **206** to resolve any problems they have with the goods and services that the service provider **201** provides. The corporate management **302***h* oversees the

operation of the service provider **201** and is ultimately responsible for its success or failure.

The business units **302** use multiple business processes **303** to interact with vendors **205** and provide goods and services to customers **206**. In some embodiments, these business processes **303** can include at least one of a quoting process **303***a*, a sales management process **303***b*, a procurement process **303***c*, a delivery and setup process **303***d*, a project planning process or project planning business process **303***e*, an invoicing and collection process **303***f*, a payables process **303***g*, a contract management process **303***h*, a maintenance process **303***i*, a support process **303***j*, and a customer relationship management (CRM) process **303***k*.

Business units **302** have the ability to interact with processes **303**, and can do so from time to time. As will be seen in FIG. **4**, business units **302** can have a preferred set of business processes **303** with which they interact on a more regular basis. For example, the vendors **205** can interact with the procurement process **303***c*, the payables process **303***g*, the contract management process **303***h*, and the support process **303***j*. In another example, the customers **206** can interact with the quoting process **303***a*, the sales management process **303***b*, the delivery and setup process **303***d*, the project planning process **303***e*, the invoicing and collection process **303***f*, the contract management process **303***h*, the maintenance process **303***i*, the support process **303***j*, and the CRM process **303***k*.

The quoting process **303***a* provides a quote to a customer **206** with the cost of a specific set of goods and services to be provided by the service provider **201**. The sales management process **303***b* helps the marketing/sales department **302***a* to organize their activities efficiently and manage their activities with the customers **206**. The procurement process **303***c* orders, receives, and processes goods and services from the vendors **205**. The delivery and setup process **303***d* ensures that goods and services from the service provider **201** arrive at the customers **206** and are installed and configured properly. The project planning process **303***e* coordinates the resources of the service provider **201** in order to satisfy the commitments of the service provider **201** to the customers **206** efficiently and in a timely manner. The invoicing and collection process **303***f* delivers invoices to customers **206**, notifies customers **206** when a payment is due and ensures that the customers **206** pay the service provider **201** in a timely manner. The payables process **303***g* facilitates the process that includes the service provider **201** paying the vendors **205** in a timely manner. The contract management process **303***h* can negotiate the terms of agreements between the service provider **201** and the customers **206**, and can also negotiate the terms of agreements between the service provider **201** and the vendors **205**. The maintenance process **303***i* facilitates the process that includes completing, by the service provider **201** in a timely manner, periodic tasks required by the customers **206**. The support process **303***j* addresses product-related problems that the customers **206** are having, and can continue to work on those problems until they are resolved to the satisfaction of the customer **206**. The CRM process **303***k* facilitates contact between the service provider **201** and customers **206** by maintaining contact information and company information, and providing convenient interfaces for using that information to initiate telephone calls, emails, text messages, letters, faxes, or other forms of communication.

The business processes **303** use the product data **301**. The product data **301** is a key shared repository for data about the goods and services provided by the service provider **201**. Systems and methods of the present disclosure can use product data **301** to serve as a unifying mechanism for the business processes **303**, the business units **302** that use those business processes **303**, and the staff **202** that are part of those business units **302**.

FIG. **4** illustrates a block diagram of the relationships between the business units **302** and the business processes **303** within a service provider **201**. Business units **302** can interact with business processes **303**, and certain interactions may occur more frequently in normal business operations. The interactions described with respect to FIG. **4** are not intended to be limiting, but are intended to illustrate customary business practices.

FIG. **4***a* illustrates an exemplary interaction between the marketing/sales department **302***a* and various business processes including, e.g., at least one of the quoting process **303***a*, sales management process **303***b*, contract management process **303***h*, support process **303***j*, or CRM process **303***k*. The marketing/sales department **302***a* can drive the quoting process **303***a* by communicating with the customer **206** and arriving at an understanding of the customer's needs, then assembling the quote from goods and services in the product data **301**, including the prices of those goods and services. The marketing/sales department **302***a* can interact with the sales management process **303***b* on a regular basis to find customers **306** and close orders with these customers. The marketing/sales department **302***a* can interact with the contract management process **303***h* to finalize agreements with customers **206** for products that may require ongoing service and payment. The marketing/sales department **302***a* can interact with the support process **303***j* for pre-sale support activity when, e.g., a prospective customer has a problem with a product or service and needs help from the support department **302***g*. The marketing/sales department **302***a* can use the CRM process **303***k* when the department attempts to contact a customer **206**. In these interactions, the product data **301** can serve as the basis of interaction between the business processes **303**, and can also serve as a common way for the marketing/sales department **302***a* to understand their interactions with those business processes.

FIG. **4***b* illustrates an exemplary interaction between the project management department **302***b* and various processes including, e.g, the quoting process **303***a*, procurement process **303***c*, delivery and setup process **303***d*, project planning process **303***e*, support process **303***j*, or CRM process **303***k*. The project management department **302***b* can use the details from the quoting process **303***a* to build a project plan to deliver that quote, and can also integrate that project plan with other projects that are going on within the service provider **201**. The project management department **302***b* can use the procurement process **303***c* to purchase external goods and services needed from vendors **205** in order to implement the project plan. The project management department **302***b* can use the delivery and setup process **303***d* to deliver the goods and services indicated by the project plan to the customer **206**. The project management department **302***b* can interact with the support process **303***j* whenever there are unforeseen difficulties in implementing the project plan that must be resolved for the customer **206**. The project management department **302***b* can use the CRM process **303***k* to contact a customer **206**. In some or all of these interactions, the product data **301** can serve as the basis of interaction between the business processes **303**, and can also serve as a common way for the project management department **302***b* to understand their interactions with those business processes.

FIG. **4***c* illustrates an exemplary interaction between the purchasing department **302***c* and various business processes including, e.g., at least one of the procurement process **303***c*, payables process **303***g*, contract management process **303***h*, support process **303***j*, or CRM process **303***k*. The purchasing department **302***c* can manage the procurement process **303***c* to order goods and services from vendors **205** that are needed in order for the service provider **201** to meet its commitments to its customers **206**. The purchasing department **302***c* can help to manage the payables process **303***g* to pay the vendors **205** in a timely manner and manage the cash flow of the service provider **201**. The purchasing department **302***c* can interact with the contract management process **303***h* to get more favorable purchasing terms from vendors **205** by entering into longer term purchase agreements with them. The purchasing department **302***c* can also interact with the contract management process **303***h* to set up terms for services rendered by vendors **205** for the service provider **201** and its customers **206**. The purchasing department **302***c* can interact with the support system **303***j* when a customer **206** has an issue concerning an interaction with a vendor **205** for which the purchasing department **302***c* is managing the relationship. The purchasing department **302***c* can use the CRM process **303***k* to contact a customer **206**. In some or all of these interactions, the product data **301** can serve as the basis of interaction between the business processes **303**, and can also serve as a common way for the purchasing department **302***c* to understand their interactions with those business processes.

FIG. **4***d* illustrates an exemplary interaction between the engineering department **302***d* and various business processes including, e.g, at least one of the delivery and setup process **303***d*, project planning process **303***e*, maintenance process **303***i*, support process **303***j*, or CRM process **303***k*. The engineering department **302***d* can implement the setup part of the delivery and setup process **303***d* at the site of the customer **206** by implementing any installation and configuration services needed for the goods and services provided by the service provider **201** to the customer **206**. The engineering department **302***d* can use the project planning process **303***e* as a source of information on the selection and timing of tasks that are required in order to implement the overall project plan. The engineering department **302***d* can implement the maintenance process **303***i* at the site of the customer **206** by implementing the periodic work agreed to by the service provider **201** and the customer **206**. The engineering department **302***d* can use the support process to understand and diagnose problems encountered by customers **206**, and to implement and track the solutions to those problems. The engineering department **302***d* can use the CRM process **303***k* to contact a customer **206**. In some or all of these interactions, the product data **301** can serve as the basis of interaction between the business processes **303**, and can also serve as a common way for the engineering department **302***d* to understand their interactions with those business processes.

FIG. **4***e* illustrates an exemplary interaction between the accounting department **302***e* and various business processes including, e.g., at least one of the quoting process **303***a*, procurement process **303***c*, delivery and setup process **303***d*, invoicing and collection process **303***f*, payables process **303***g*, support process **303***j*, or CRM process **303***k*. The accounting department **302***e* can use the quoting process **303***a* as a source of information for creating an invoice to bill the customer **206**. The accounting department **302***e* can use information from the procurement process **303***c* to generate forecasts of expenses to manage the cash flow of the service provider **201**. The accounting department **302***e* can use the delivery and setup process **303***d* to know when deliveries take place at customers **206** in order to coordinate invoices and avoid invoicing a customer **206** for something that has not yet been delivered. The accounting department **302***e* can manage the invoicing and collection process **303***f* to deliver invoices to customers **206** and collect payments from them, and can manage the cash flow of the service provider **201**. The accounting department **302***e* can manage the payables process **303***g* to pay vendors **205** in a timely manner, and can manage the cash flow of the service provider **201**. The accounting department **302***e* can use the support process **303***j* to manage and track billing and invoicing issues generated by customers **206**. The accounting department **302***e* can use the CRM process **303***k* to contact a customer **206**. In some or all of these interactions, the product data **301** can serve as the basis of interaction between the business processes **303**, and can also serve as a common way for the accounting department **302***e* to understand their interactions with those business processes.

FIG. **4***f* illustrates an exemplary interaction between the legal department **302***f* and various business processes including, e.g., at least one of the contract management process **303***h*, support process **303***j*, or CRM process **303***k*. The legal department **302***f* can manage the contract management process **303***h* to define and negotiate the terms of any agreement into which the service provider **201** enters. The legal department can use the support process **303***j* to manage and track any issues generated by customers **206** that involve the terms of an agreement. The legal department **302***f* can use the CRM process **303***k* to contact a customer **206**. In some or all of these interactions, the product data **301** can serve as the basis of interaction between the business processes **303**, and can also serve as a common way for the legal department **302***f* to understand their interactions with those business processes.

FIG. **4***g* illustrates an exemplary interaction between the support department **302***g* and various business processes including, e.g., at least one of the support process **303***j* or CRM process **303***k*. The support department **302***g* can manage the support process **303***j* and can use it to track and respond to all issues with customers **206**. The support department **302***g* can use the CRM process **303***k* to contact a customer **206**. In some or all of these interactions, the product data **301** can serve as the basis of interaction between the business processes **303**, and can also serve as a common way for the support department **302***g* to understand their interactions with those business processes.

FIG. **4***h* illustrates an exemplary interaction between corporate management **302***h* and various business processes including, e.g., at least one of the business processes **303***a*-**303***k*. Corporate management **302***h* can use information from business processes **303***a*-**303***k* to track and understand the operation of the business of the service provider **201** as a whole. This can give a "360-degree view" of the business and can be valuable in making decisions about how to run the business. Again, the product data **301** can serve as the basis of interaction between the business processes **303**, which can facilitate oversight provided by corporate management **302***h* with respect to the status of processes **303** and to understand the implications of same.

FIG. **5** illustrates a block diagram of product data **301**. In this example, there are three different classes of product data **301**. For example, one class of product data **301** can be labor **501**, which describes products that are services. Services-oriented products can include one-time actions that are taken by a person. For example, labor **501** can include the action

of setting up the initial configuration for a piece of equipment. Another example of labor **501** can include the action of installing a software update onto a computer. Yet another example of labor **501** can include the action of replacing a part in a network router that is broken in order to restore its function. Labor products **501** can be invoiced at a fixed rate, based on the work that is done, or at an hourly rate, based on the amount of time spent doing the work.

A second class of product data **301** is parts **502**, which describes products that are purchased entities delivered to the customer **206**. For example, parts **502** can include a new piece of equipment that is installed for the customer **206**. Another example of parts **502** can include a replacement part for a network router that is broken. In some embodiments, parts **502** can also include non-physical entities such as a software license for a commercial third party software application that is installed for the customer **206**. In another example, parts **502** can include an extended warranty from a manufacturer covering repair and updates for a longer period of time than the standard warranty. Parts products **502** can be invoiced at the cost to the service provider **201** plus a markup.

In some embodiments, parts products can include a plurality of subclasses. For example, parts products can include two sub-classes, inventory parts **504** and non-inventory parts **505**. Inventory parts **504** can be parts **502** that the service provider **201** orders ahead of time and keeps in stock, which can make it convenient and quick to deliver the inventory parts **505** to a customer **206**. Non-inventory parts **505** can be parts **502** that the service provider orders from a vendor **205** on an as-needed basis. The vendor **205** can delivers the parts **502** directly to the customer **206**. The vendor **205** can also deliver the parts **502** to the service provider **201**, who can then deliver them to the customer **206**. Inventory parts **504** can be invoiced with a larger markup than non-inventory parts **505**, because the service provider may need to pay the inventory and carrying costs associated with the inventory parts **504**.

In some embodiments, product data **301** can include a third class for agreements **503**, which describes products that are repeated or periodic services. Repeated or periodic services can refer to actions taken by a person on a regular basis, and can be covered by service agreements that are entered into between the service provider **201** and the customer **206**. Examples of agreements **503** can include agreements to periodically clean a piece of equipment at the site of the customer **206**; install updates for a commercial third party software application as they are released; and provide a network routing solution to meet a written specification, and continually update the network to meet the written specification as the environment changes. Agreements products **503** are can be invoiced at a fixed fee for a given time period, such as monthly or yearly.

FIG. **6** illustrates a block diagram of using the product data **301** to unify communications between the various business processes **303**. FIG. **6** illustrates a number of different forms of intermediate data **601** between the business processes **301**, but in every case the intermediate data **601** is made up of products from the product data **301**, as will be described in further detail here. In this way, the product data **301** serves as a common source of information for both the business processes **301** and the intermediate data **601** that is used to transfer information between them. FIG. **6** is not intended to be limiting, but is instead intended to illustrate many of the aspects of the flow of information inside a service provider **201**. Other embodiments of a service provider **201** have elements of data flow that are not shown in FIG. **6**.

In some embodiments, the marketing/sales department **302***a* can commence the process by using the quoting business process **303***a* to create a quote **601***a* from the product data **301**. In other embodiments, different departments or processes can commence the flow. The quote **601***a* can include a list of products designed to address the needs of a customer **206**. This list can include a plurality of classes of products such as labor products **501**, parts products **502**, and agreements products **503**. For example, a customer **206** that needs an email server may get a quote **601***a* that includes the hardware for the server, which is a parts product **502**, the one-time setup for that server, which is a labor product **501**, and the ongoing maintenance for that server, which is an agreements product **503**. The quote **601***a* includes prices for all of the products in the list, so that the customer **206** knows in advance the total price for what is being bought, and exactly what that price includes.

The sales management business process **303***b* now has the responsibility of selling the products to the customer **206**. The marketing/sales department follows a series of steps for working with the customer **206**. The steps can reference the list of products in the quote **601***a*. In some embodiments, the sale is complete when the customer **206** agrees with every element of the quote **601***a*. At that time, the sale has been closed and the quote **601***a* is converted to a sale **601***b*. The sale **601***b* is a different form of information, but it is a list of the products that the customer **206** has agreed to purchase, so it is created from the quote by using the same product data **301** that the quote refers to. This is an example of how the product data **301** serves as a common source of information for both the quoting business process **303***a* and the sales management business process **303***b*.

Once the sale **601***b* is finalized, the list of products in it is copied, transferred, or otherwise conveyed to several places. For example, the list of parts products **501** in the sale **601***b* can be copied to a sales order **601***c*. The sales order **601***c* is a list of the parts products **501** that need to be ordered in order to deliver the quote **601***a*. The sales order goes to the procurement business process **303***c*, which is responsible for procuring the parts products **501** that are listed in the sales order. Since the sales order **601***c* is created from a list of products from the product data **301**, this is an example of how the product data **301** serves as a common source of information for both the sales management business process **303***b* and the procurement business process **303***c*.

The list of agreements products in the sale **601***b* is used by the contract management business process **303***h*. Each agreements product in the sale **601***b* is used to generate an agreement **601***g*. The agreement is created from information in the product data **301** about the product in the list of products in the sale **601***b*, so this is an example of how the product data **301** serves as a common source of information for both the sales management business process **303***b* and the contract management business process **303***h*. The contract management business process **303***h* is responsible for negotiating the terms of the agreements **601***g* with the customer **206**, and updating the agreements **601***g* with the results of the negotiation.

The list of all products in the sale **601***b* is used by the invoicing and collection business process **303***f*. Each product in the sale **601***b* is copied into the invoicing system, which is used to create invoices **601***i* to be sent to the customer **206**. The invoices **601***i* are created from information such as pricing in the product data **301** for the list of

products in the sale **601***b*, so this is an example of how the product data **301** serves as a common source of information for both the sales management business process **303***b* and the invoicing and collections business process **303***f*. The invoices **601***i* are not actually sent to the customer **206** until the products listed on them have actually been delivered; this is described later more fully.

The list of labor products **501** in the sale **601***b* is used by the project planning business process **303***e*. The project planning business process **303***e* creates a project plan **601***h*, which is a list of tasks needed to deliver the quote **601***a*. Each labor product **501** listed in the sale **601***b* is copied into one task, and the product data **301** provides information such as the expected length of time for the task. The project planning business process **303***e* assigns the tasks to appropriate staff **202** within the service provider **201** based on the nature of the tasks, and schedules the tasks based on the availability of the staff **202**. The result is the completed project plan **601***h*. The tasks in the project plan **601***h* are created using information from the product data **301** about the labor products **501** in the sale **601***b*, so this is an example of how the product data **301** serves as a common source of information for both the sales management business process **303***b* and the project planning business process **303***e*.

The list of products in the sales order **601***c* is used by the procurement business process **303***c* to create purchase orders **601***d*. A purchase order **601***d* is a list of products to be procured from one vendor **205**. Each product in the sales order **601***c* that is procured from the same vendor **205** is copied into the purchase order **601***d* for that vendor **205**. The purchase order **601***d* is then sent to the vendor **205** and is also used by the payables business process **303***g*. The purchase orders **601***d* are created using the vendor information in the product data **301**, so this is an example of how the product data **301** serves as a common source of information for both the procurement business process **303***c* and the payables business process **303***g*.

The list of products in the purchase order **601***d* is used by the payables business process **303***g* to create payments **601***e* to be sent to the vendors **205**. The payables business process **303***g* monitors the deliveries of equipment **601***f* from the vendors **205** and coordinates the payments **601***e* to correspond to the delivery times and terms agreed upon with the vendors **205**. The payments **601***e* are created and scheduled using vendor information and payment terms in the product data **301**, so this is another example of how the product data **301** serves as a common source of information for both the procurement business process **303***c* and the payables business process **303***g*.

The project plan **601***h* is used by the delivery and setup business process **303***d* to schedule the delivery of equipment **601***f* to the customer **206** as well as the use of staff **202** to set up the equipment **601***f* once it has been delivered. Each task in the project plan **601***h* is copied into a service ticket **6011**, and the service tickets are used by the staff **202** to properly organize their time so that the setup of the equipment **601***f* is done in a timely and efficient manner. The service tickets **601***l* are created using information about the time and expense taken from the product data **301** for the labor products **501** in the tasks in the project plan **601***h*, so this is an example of how the product data **301** serves as a common source of information for both the project planning business process **303***e* and the delivery and setup business process **303***d*.

The staff **202** addressing the service tickets **601***l* creates timesheets **601***k* for the work they are doing. Information from the service ticket **6011** that is completed is copied into the timesheet entry for that ticket, and the timesheet goes to the invoicing and billing business process to be included in the invoice **601***l* that is sent to the customer **206**. This closes the loop that was described previously where a labor product **501** entered the invoicing and collection business process **303***f* from the sale **601***b*; the arrival of the same labor product **501** from a timesheet **601***k* indicates that the labor product **501** has been delivered to the customer and can now be included in an invoice **601***l* that is sent to the customer. Since the same labor product **501** is used from the product data **301**, this is an example of how the product data **301** serves as a common source of information for the sales management business process **303***b*, the invoicing and collection business process **303***f*, and the delivery and setup business process **303***d*.

The agreements **601***g* are used by the maintenance business process **303***i* to schedule and deliver the ongoing tasks required to meet the terms of the agreements **601***g*. The terms of the agreements **601***g* in the products in the agreements are copied into service tickets **601***l*, and the service tickets are used by the staff **202** to properly organize their time so that the periodic maintenance tasks are done in a timely and efficient manner. The service tickets **601***l* are created using information about the scheduling, time, and expense taken from the product data **301** for the agreements products **503** in the agreements **601***g*, so this is an example of how the product data **301** serves as a common source of information for both the contract management business process **303***h* and the maintenance business process **303***i*.

The service tickets **601***l* created by the maintenance business process **303***i* can be handled in essentially the same way as previously described for service tickets **601***l* created by the delivery and setup business process **303***d*. In much the same way, this is an example of how the product data **301** serves as a common source of information for the sales management business process **303***b*, the invoicing and collection business process **303***f*, and the maintenance business process **303***i*.

The customers **206** have ongoing issues **601***m* with the goods and services delivered by the service provider **201**. The support business process **303***j* takes these issues **601***m* in a triage process and creates a service ticket **601***l* for each ticket. Since each issue is in reference to a particular product, the support process copies information from the product data **301** into the service ticket **601***l*. The service tickets are then used by staff **202** to prioritize and organize time and effort efficiently to arrive at solutions **601***n* for the issues, which are delivered to the customers **206**. The product information in the service tickets **601***l* is integral in understanding, diagnosing, and solving the issues **601***m*, so this is an example of how the product data **301** serves as a common source of information for the support business process **303***j* and every other business process **301**, since any other business process **301** can be involved in solving customer issues **601***m* at some point in time.

The service tickets **601***i* created by the support business process **303***j* are handled in essentially the same way as previously described for service tickets **601***l* created by the delivery and setup business process **303***d*. In much the same way, this is an example of how the product data **301** serves as a common source of information for the sales management business process **303***b*, the invoicing and collection business process **303***f*, and the support business process **303***j*.

The logical end of the overall flow is reached when the customer **206** delivers revenue **601***j* to the service provider **201** in response to receiving an invoice **601***i*. The revenue

601*i* goes to the invoicing and collection business process **303***f*, which matches the revenue against the invoices **601***i* that have been delivered to the customer **206** and closes the outstanding billing. In this final step, the revenue **601***j* can be matched to the product items in the invoice **601***i* that is being paid, so this is an example of how the product data **301** serves as a common source of information for the invoicing and collection business process **303***f* to manage the financial relationship with the customer **206**.

FIG. **7** illustrates a block diagram of the way in which the product class affects how information from the product data **301** is copied to the business processes **303** in the system. The product class is the entity that divides the product data **301** into labor products **501**, which are detailed in FIG. **7***a*, parts products **502**, which are detailed in FIG. **7***b*, and agreements products **503**, which are detailed in FIG. **7***c*.

FIG. **7***a* illustrates the way in which information from labor products **501** is copied to the business processes **303** in the system. In particular, information from labor products **501** is copied to the quoting business process **303***a*, delivery and setup business process **303***d*, project planning business process **303***e*, invoicing and collection business process **303***f*, and contract management business process **303***h*.

The quoting business process **303***a* creates a quote **601***a* in which every line item is a product from the product data **301**. The line item uses information from the labor product data **501** to fill in, among other things, the description, part number, hourly rate, fixed fee, technician skill level, estimated time, and arbitrary notes for the product.

The delivery and setup business process **303***d* creates service tickets **601***l* for each task that is required in order to complete the delivery and setup. Each service ticket uses information from the labor product data **501** to fill in, among other things, the description, estimated time, customer name, customer contact information, and arbitrary notes for the ticket.

The project planning business process **303***e* creates a project plan **601***h* in which every task corresponds to a product from the product data **301**. The task uses information from the labor product data **501** to fill in, among other things, the description, budgeted time, billing type, resource type (skill level) required, and arbitrary notes for the task.

The invoicing and collection business process **303***f* creates an invoice **601***i* in which every line item is a product from the product data **301**. The line item uses information from the labor product **501** to fill in, among other things, the description, part number, hourly rate, fixed fee, billing method, and arbitrary notes for the product.

The contract management business process **303***h* creates agreements **601***g* when a labor product **501** is delivered by an outside vendor **205** rather than a staff member **202** of the service provider **201**. In this case, the contract management must set up an agreement **601***g* with the vendor **205** specifying the terms for the delivery of the labor product **501**. The agreement **601***g* uses information from the labor product **501** to fill in, among other things, the name, description, hourly rate, fixed fee, billing method, estimated time, vendor name, and arbitrary notes for the product.

FIG. **7***b* illustrates the way in which information from parts products **502** is copied to the business processes **303** in the system. In particular, information from parts products **502** is copied to the quoting business process **303***a*, procurement business process **303***c*, delivery and setup business process **303***d*, project planning business process **303***e*, invoicing and collection business process **303***f*, and payables business process **303***g*.

The quoting business process **303***a* creates a quote **601***a* in which every line item is a product from the product data **301**. The line item uses information from the parts product data **502** to fill in, among other things, the description, part number, packaging, price, pricing modifiers, image, arbitrary notes, and sourcing information for the product.

The procurement business process **303***c* creates a purchase order **601***d* in which every line item is a product from the product data **301**. The line item uses information from the parts product data **502** to fill in, among other things, the product ID, description, quantity, price, customer site, packaging, pricing modifiers, and arbitrary notes for the product.

The delivery and setup business process **303***d* creates service tickets **601***i* for each task that is required in order to install and configure the parts product **502**. Each service ticket uses information from the parts product data **502** to fill in, among other things, the description, estimated time, customer name, customer contact information, and arbitrary notes for the ticket.

The project planning business process **303***e* creates a project plan **601***h* in which every task corresponds to a product from the product data **301**. The tasks corresponding to parts product data **502** are the tasks for installing and configuring those parts products **502**. The tasks use information from the parts product data **502** to fill in, among other things, the description, budgeted time, billing type, resource type (skill level) required, and arbitrary notes for the task.

The invoicing and collection business process **303***f* creates an invoice **601***i* in which every line item is a product from the product data **301**. The line item uses information from the parts product **501** to fill in, among other things, the description, part number, packaging, price, pricing modifiers, image, arbitrary notes, and sourcing information for the product.

The payables business process **303***g* creates payments **601***e* for products that are ordered from vendors **205**. The payments correspond to a series of parts products, and the payments use information from the parts product data **502** to fill in, among other things, the description, price, part number, and arbitrary notes for the product.

FIG. **7***c* illustrates the way in which information from agreements products **503** is copied to the business processes **303** in the system. In particular, information from agreements products **503** is copied to the quoting business process **303***a*, invoicing and collection business process **303***f*, contract management business process **303***h*, and maintenance business process **303***i*.

The quoting business process **303***a* creates a quote **601***a* in which every line item is a product from the product data **301**. The line item uses information from the agreements product data **503** to fill in, among other things, the name, description, hourly rate, fixed fee, billing method, estimated time, vendor name, and arbitrary notes for the product.

The invoicing and collection business process **303***f* creates an invoice **601***i* in which every line item is a product from the product data **301**. The line item uses information from the agreements product **503** to fill in, among other things, the name, description, hourly rate, fixed fee, billing method, estimated time, vendor name, and arbitrary notes for the product.

The contract management business process **303***h* creates agreements **601***g* to fulfill the obligations required by the agreements products **503**. The contract management sets up an agreement **601***g* with the customer **206** specifying the terms for the delivery of the agreements product **503**. The agreement **601***g* uses information from the labor product **501** to fill in, among other things, the name, description, hourly

rate, fixed fee, billing method, estimated time, vendor name, and arbitrary notes for the product.

The maintenance business process **303***d* creates service tickets **601***l* for each task that is required in order to complete the periodic maintenance task. Each service ticket uses information from the agreement product data **503** to fill in, among other things, the description, hourly rate, fixed fee, billing method, estimated time, scheduling information, customer name, customer contact information, and arbitrary notes for the ticket.

FIG. **8** illustrates a block diagram of reliable synchronization of the quote **601***a* and invoice **601***i* seen by the customer **206**. After the quoting business process **303***a* prepares the quote **601***a*, the quote **601***a* is sent to the customer **206**. The customer may interact with the quote **601***a* and may even change it. After this, many business processes **303** interact with the quote **601***a* and are driven by it. Eventually, sometimes much later, one end result of the sale is the invoicing and collection business process **303***f*, which prepares the invoice **601***i* to be sent to the customer **206**. This is a very important process to the service provider **201**, because it is the mechanism by which the business makes money. In some systems not described by the present disclosure, the invoice **601***i* is created by a person **801** using a manual process that involves referring to the quote **601***a*. Preparing the invoice **601***i* this way has a substantial risk of introducing errors, including simple typographical errors, transcription errors, referring to the wrong copy of a quote, and so on. Unfortunately, the consequences of a customer **206** seeing a mismatch between the quote **601***a* and the invoice **601***i* are very negative. The customer **206** is not sure what amount to pay, which delays the payment. The customer **206** may interpret the mismatch as hidden charges or over-billing. The customer is likely to lose faith in the service provider **201** as a result of this relatively minor error.

The present disclosure completely avoids the unfortunate situation described. Since both the quote **601***a* and the invoice **601***i* are derived from the same list of products from the product data **301**, and the same product list is used by both the quoting process **303***a* and the invoicing and collection process **601***i*, the quote **601***a* and the invoice **601***i* seen by the customer **206** always match exactly. In this way, the customer knows well in advance what payment is expected, so the payment is handled smoothly. The customer feels that the service provider **201** is in control and professional.

FIG. **9** illustrates a block diagram of interfaces between product data **301** and external systems **902-903**. The service provider **201** may use external systems for some business processes. For example, the service provider **201** may use an external system when the service provider **201** previously chose a system for one business process long before deciding to use a resource planning system **204**, and does not want to train employees to work with a different system. In another embodiment, the service provider **201** previously chose or can choose a system for one or more business process based on special needs that require the features of that system. In another embodiment, the service provider **201** previously chose or can choose a system for one business process based on requirements imposed by a customer **206** or a vendor **205**. FIG. **9** illustrates an embodiment where the sales management process is implemented using an external sales management system **902***a* such as the system provided by Salesforce.com of San Francisco, Calif., USA. FIG. **9** illustrates an embodiment where the quoting process is implemented using an external quoting system **902***b* such as the system provided by Quosal LLC of Bothell, Wash., USA. FIG. **9** illustrates an embodiment where the invoicing and collection process and the payables process is implemented using an external accounting system **902***c* such as the QuickBooks system provided by Intuit, Inc. of Mountain View, Calif., USA. For each of these external systems, the resource planning system **204** provides an application programming interface (API) **901** that communicates information both ways between the product data **301** and the external system **902**. The API **901** uses a well defined interface defined by the supplier of the external system **902**, and is greatly simplified by the fact that it only needs to correctly interface to a single product data source **301** in order to work with the rest of the resource planning system **204**. In this way, a sales API **901***a* is provided to interface the product data **301** with the external sales management system **902***a*, a quoting API **901***b* is provided to interface the product data **301** with the external quoting system **902***b*, and an accounting API **901***c* is provided to interface the product data **301** with the external accounting system **902***c*.

In some embodiments, external interfaces can facilitate the use of external sources of product data. For example, external interfaces can facilitate importing standard product data from an external product database **903**, such as the product database provided by Etilize, Inc. of Denver, Colo., USA. The external product database **903** may include thousands of commercially available products. To use this external product database **903**, the resource planning system **204** provides a product API **901***d* that communicates information from the external product database **903** to the product data **301**. The API **901***d* uses a well defined interface defined by the supplier of the external product database **903**, and is greatly simplified by the fact that it only needs to correctly interface to a single product data source **301** in order to work with the rest of the resource planning system **204**.

FIG. **10** illustrates a block diagram of templates **1001** for product data **301**. When the marketing/sales department **302***a* prepares a quote **601***a* for a customer, there is often a need to add to the quote **601***a* a collection of products that are commonly grouped together. In one embodiment, a quote for a small business setup includes a server, a router, a firewall/VPN, operating system software for the server, VPN software for the employees of the business, software installation, network installation, and monitoring and maintenance for the server. The service provider **201** wants to ensure that all of these products are included in the quote with the right configuration and pricing, but it is inefficient and error prone to require that all of the sales staff knows this product configuration, especially since it will change from time to time. To address this issue, the resource planning system **204** provides templates **1001** that are used to manage groups of products.

A list of templates **1001** is available for generating quotes **601***a*. In one embodiment, template 1 **1001***a* contains product references to product 1 **1002***a* through product j **1002***c*, and template 2 **1001***b* contains product references to product k **1002***d* through product n **1002***f*, as well as a reference to product 2 **1002***e*. Each of the product references **1002** in the templates **1001** is a pointer to the actual product information **1010** in the product data **301**, so that when the product data **301** is updated, the templates **1001** are automatically updated as well. When template 1 **1001***a* and template 2 **1001***b* are both added to a quote **601***a*, the quote **601***a* lists line items **1003** for product 1 **1003***a* through product n **1003***c*. The line item **1003***b* for product 2 indicates a quantity of 2, because one was generated by reference **1002***b* in template 1 **1001***a*, and the other was generated by reference **1002***e* in template 2 **1001***b*.

Since the quote **601***a* is generated automatically from the product data **301**, it is simple for the marketing/sales department to generate the quote in different formats for the convenience of the customer. In one embodiment, the quote **601***a* is organized as a simple list of the products. In a second embodiment, the quote **1004** is organized by the templates **1005** used to make the quote, with the products **1006** listed within the templates. In a third embodiment, the quote **1007** is organized by the product classes labor **1008***a*, parts **1008***b*, and agreements **1008***c*, and the products are listed in each class **1008** as described previously, as labor products **1009***a*, parts products **1009***b*, and agreements products **1009***c*.

In this way, templates **1001** allow the sales/marketing department **302***a* to provide a quote **601***a* to a customer that contains commonly offered combinations of products, without requiring the sales/marketing department **302***a* to have detailed knowledge of the exact combination of products used in those commonly offered combinations.

FIG. **11** illustrates a block diagram of bundles **1101** for product data **301**. When the marketing/sales department **302***a* prepares a quote **601***a* for a customer, it may add to the quote **601***a* a product that is provided by the service provider **201**, but is internally divided into a number of components. In one embodiment, the service provider **201** provides a product that is a small business server, but internally the product is made up of the server hardware, the operating system software license, the labor to install and configure the server, and the agreement for maintaining the server. In some embodiments, the resource planning system **204** provides bundles **1101** that are used to manage products that are made up of a number of components. The bundles **1101** can hide details from the customer, simplify the quote to make it more readable, or disguise details of the server hardware to discourage the customer **206** from looking for another source for the hardware.

A list of bundles **1101** is available for generating quotes **601***a*. In one embodiment, bundle 1 **1101***a* contains product references to product 1 **1104***a* through product j **1104***c*, and bundle 2 **1101***b* contains product references to product k **1104***d* through product n **1104***f*, as well as a reference to product 2 **1104***e*. Each of the product references **1104** in the bundles **1101** is a pointer to the actual product information **1010** in the product data **301**, so that when the product data **301** is updated, the bundles **1101** are automatically updated as well. Each product reference **1104** in a bundle **1101** contains both the product reference itself **1103**, and an indicator **1102** as to whether or not the product reference should be hidden. In FIG. **11**, all of the product references **1104***a*-**1104***c* in bundle 1 **1101***a* are hidden, and only the product reference **1104***f* to product n in bundle 2 **1101***b* is hidden.

When bundle 1 **1101***a* and bundle 2 **1101***b* are both added to a quote **601***a*, the quote **601***a* lists one line item **1105***a* for bundle 1, and a line item **1105***b* for bundle 2 that is broken down into line items **1106** for all of the product references **1104** in bundle 2 **1101***b* except for product n **1104***f*, which is marked as hidden.

In this way, bundles **1101** allow the service provider **201** to provide its own products that are made up of component products, and also provide the ability to hide the details of those products where it is advantageous for the operation of the business.

In some embodiments, the system can determine to hide one or more details based on a user identifier (e.g., username, biometric information, pin number) associated with a user of the system, such as a customer or other entity using the system. For example, the system may include a list of users that are authorized to view certain data, and compare the user identifier of the user with the list to determine whether the user is authorized to view such data. In some embodiments, the system may prompt the user for a password prior to making the determination. Upon determining that the user is not authorized to view certain data (e.g., price or product details), the system may omit or otherwise censor the data such that the data is effectively hidden from the user. In some embodiments, the user can request access to the hidden data. The system can forward the request to a system manager or operator, who may grant or deny the request.

FIG. **12** illustrates an embodiment of a user interface, provided by the resource planning system **204**, for overall access. The main display **1201** shows a view of the product data **301**. The navigation display has tabs to select different main displays for contacts **1202**, sales **1203**, marketing **1204**, procurement **1205**, project **1206**, service desk **1207**, time and expense **1208**, finance **1209**, and setup **1210**.

FIG. **13** illustrates an embodiment of a user interface, provided by the resource planning system **204**, for displaying and modifying product data. The display **1301** shows a list of the product data, with a single line for each product **1302**. The columns **1303**-**1311** display information about each product. Column **1303** displays the product ID. Column **1304** displays the description of the product. Column **1305** displays the price of the product to the customer **206**. Column **1306** displays the cost of the product from the vendor **205**. Column **1307** displays whether or not the product is taxable. Column **1308** displays the type of the product, column **1309** displays the category of the product. and column **1310** displays the sub-category of the product. Together, the type, category, and sub-category of the product displayed by columns **1308**-**1310** affect the way the product is treated by the rest of the resource planning system **204**. Column **1311** displays the class of the product as described previously with respect to FIG. **5**.

FIG. **14** illustrates an embodiment of a user interface, provided by the resource planning system **204**, for displaying and modifying a single item of product data. The display **1401** is shown by selecting one of the products **1302** in the display **1301** described previously with respect to FIG. **13**. Entry **1402** allows the product ID, which is displayed in column **1303** in FIG. **13**, to be modified. Entry **1403** allows the product class, which is displayed in column **1311** in FIG. **13**, to be modified. Entry **1404** allows the product price, which is displayed in column **1305** in FIG. **13**, to be modified. Entry **1405** allows the product cost, which is displayed in column **1306** in FIG. **13**, to be modified.

FIG. **15** illustrates an embodiment of a user interface, provided by the resource planning system **204**, for displaying and modifying a quote for a customer. The display has tabs across the top allowing selection of different components of the quote. Tab **1501** selects the hardware component of the quote. Tab **1502** selects the software component of the quote. Tab **1503** selects the services component of the quote. When a product is added to the quote, the product type, product category, product sub-category, and product class displayed in columns **1308**-**1311** of FIG. **13** determine the component of the quote to which the product belongs. Every product that is added to the quote adds a row to the quote. In one embodiment, the quote has two hardware products, which appear in row **1504** and row **1505** in the hardware section **1501** of the quote. Each row has columns **1506**-**1511** that describe the product in the row. Column **1506** displays the long description of the product. Column **1507** displays the manufacturer's part number for the product. Column **1508** displays the number of products that are in the quote.

Column **1509** displays the unit price of the product, and column **1510** displays the total price for the product in the quote. Column **1511** displays any notes relevant to the product in the quote.

FIG. **16** illustrates an embodiment of a printable quote to be sent to a customer **206**. The quote is customized with the name and logo **1601** of the service provider **201**. The quote includes a name and other identifying information **1602**. The quote includes the customer information **1603**. The quote includes summary totals **1604** of the price being quoted for different classes of products. The quote also includes a total price **1605** for easy reference by the customer **206**.

FIG. **17** illustrates an embodiment of a user interface, provided by the resource planning system **204**, for sales management. The display shows all the sales opportunities being pursued, for easy reference by the sales staff. Each sales opportunity is displayed as one row **1701**. Each row has multiple columns **1702-1707** that display the data for that sales opportunity. Column **1702** displays the status of the opportunity. Column **1703** displays the company with which the opportunity is being pursued. Column **1704** displays the internal name of the opportunity. Column **1705** displays the margin (profit) that the opportunity would give the service provider **201** if it were closed. Column **1706** displays the next step that is required by the sales staff in order to advance the opportunity. Column **1707** displays the expected closing date for the opportunity, or the actual closing date if the opportunity has been closed.

FIG. **18** illustrates an embodiment of a user interface, provided by the resource planning system **204**, for managing a single sales opportunity. The display allows the sales staff to view and edit all the detail information about a single sales opportunity. Entry **1801** allows the internal name of the opportunity, which is displayed in column **1704** in FIG. **17**, to be modified. Entry **1802** allows the description of the opportunity to be modified.

The bottom part of the user interface is used to display several different categories of information about the opportunity. A set of tabs **1803** is used to select the category of information being displayed. In the embodiment shown in FIG. **18**, the Forecast tab is selected. This shows an area **1804** displaying the breakdown of the financials associated with each product class, and an area **1805** with the total financials for the entire opportunity.

FIG. **19** illustrates an embodiment of a user interface, provided by the resource planning system **204**, for managing the products associated with a single sales opportunity. The top part of the user interface **1901** is the same as previously illustrated with respect to FIG. **18**. In the tabs **1902**, a different tab is selected for Products. As a result, the bottom part of the user interface **1903** is modified to display the list of products that are associated with the opportunity.

FIG. **20** illustrates an embodiment of a user interface, provided by the resource planning system **204**, for creating a sales order from a sales opportunity that was won. After the sales opportunity is won, the next step is to deliver the sale from the service provider **201** to the customer **206**. Initiating this process creates a dialog box **2001** on top of the existing sales management interface **2002** (shown in part). The dialog box **2001** has a number of options **2003** about what information is copied from the sales opportunity to the sales order. After adjusting these options **2003**, clicking on the OK button **2004** creates the sales order.

FIG. **21** illustrates an embodiment of a user interface, provided by the resource planning system **204**, for displaying and modifying agreements products. The display **2101** shows a list of agreements products, where each row **2102** has information about one agreements product. The columns **2013-2106** display information about each agreements product. Column **2103** displays the product ID. Column **2104** displays the product description. Column **2105** displays the price of the agreements product for the customer **206**. Column **2106** displays the internal name of one sales opportunity that uses the product.

FIG. **22** illustrates an embodiment of a user interface, provided by the resource planning system **204**, for project management. The name of the project **2201** is the label for the display. A set of tabs **2202** selects the information shown in the display. In one embodiment, the Work Plan tab is selected as shown in FIG. **22**, and the display shows the groups of tasks **2203** with the individual tasks **2204** indented under the groups **2203**. For each task **2204**, the columns **2205-2209** display information about the task. Column **2205** displays the hours of time that are budgeted for the task. Column **2206**, which comprises a group of columns, displays the details about the task scheduling: when the task is planned, and how much time is planned to finish the task. Column **2207**, which is made up of a group of columns, displays the details about the timing of the task as it was actually completed: when the task was started, when the task was finished, and how much time was used to finish the task. Column **2208** displays the current status of the task. Column **2209** displays the staff members who are responsible for completing the task.

FIG. **23** illustrates an embodiment of a user interface, provided by the resource planning system **204**, for managing procurement. The display header **2301** indicates that the page displays information about purchasing. The display is a list of items that need to be purchased, where each row **2302** is a single item for purchase. The columns **2303-2305** display information about each item for purchase. Column **2303** displays the quantity (number) of items to purchase. Column **2304** displays the cost of the item from the vendor **205**. Column **2306** displays the location where the item should be delivered.

FIG. **24** illustrates an embodiment of a user interface, provided by the resource planning system **204**, for creating a service ticket from a sales order. After the sales order has been planned and is ready for execution, the next step is to generate tickets to drive the implementation of the sales order by engineering. Initiating this process creates a dialog box **2401** on top of the existing sales order interface **2402** (shown in part). The dialog box **2401** has a number of options **2403** about what information is copied from the sales order to the service ticket. After adjusting these options **2403**, clicking on the OK button **2404** creates the service ticket.

FIG. **25** illustrates an embodiment of a user interface, provided by the resource planning system **204**, for displaying and modifying a service ticket. The display header **2501** indicates the name and identifier of the service ticket. A set of tabs **2502** selects the information shown in the display. In one embodiment, the Ticket tab is selected as shown in FIG. **25**. As a result, the rest of the display **2503** shows information about the ticket. A large interaction area **2504** allows entry of free-form text describing any aspect of the ticket.

The initial time **2505** budgeted for the service ticket cannot be changed. This is because the value is taken from the product data **301**. This makes it clear to the engineer in charge of the ticket what the expected effort is for the ticket, and when to alert management if complications are increasing the amount of labor significantly. In this way, the

generation of the service ticket directly from the product data **301** greatly helps to control labor costs and manage overruns.

FIG. **26** illustrates an embodiment of a user interface, provided by the resource planning system **204**, for displaying and modifying the financial aspects of a service ticket. The tabs across the top of the interface are used to select the information that is displayed. Section **2601** displays the billing details, including the method used for computing the billing and the information for billing the customer. Section **2602** displays the summary for the customer expenses incurred by the service ticket. Section **2603** displays information about any external contractor used by the service provider **201** in order to complete the ticket.

FIG. **27** illustrates an embodiment of a user interface, provided by the resource planning system **204**, for displaying and modifying an invoice for a customer. The display header **2701** indicates that the interface is for generating an invoice, and provides a set of tabs for controlling the information that is displayed. In one embodiment, the Invoice tab is selected as shown in FIG. **27**, and the bottom area of the interface **2702** provides a viewing and editing capability for all aspects of the invoice that goes to the customer **206**. The editing capability includes large text areas **2703** that allow for significant customization of the invoice.

FIG. **28** illustrates an embodiment of an invoice for a customer. The invoice illustrated in FIG. **28** is generated using the interface previously described with respect to FIG. **27**. Section **2801** identifies the invoice and its terms. Section **2802** lists contact information and billing information for both the service provider **201** and the customer **206**. Section **2803** displays the detail about the products included in the invoice. Section **2804** summarizes the amount of the invoice for the customer **206**.

FIG. **29** illustrates an embodiment of classes for product data. The user interface shown in FIG. **29** is an instance of the user interface previously described with respect to FIG. **14**. The item Product Class **2901** is implemented as a pull down **2902**. The Agreement item in the pull down **2902** corresponds to agreements products **503** as previously described with respect to FIG. **5**. The Bundle item in the pull down **2902** corresponds to bundles **1101** as previously described with respect to FIG. **11**. The Inventory item in the pull down **2902** corresponds to inventory parts products **504** as previously described with respect to FIG. **5**. The Non-Inventory item in the pull down **2902** corresponds to non-inventory parts products **505** as previously described with respect to FIG. **5**. The Service item in the pull down **2902** corresponds to labor products **501** as previously described with respect to FIG. **5**.

FIG. **30** illustrates an embodiment of a user interface, provided by the resource planning system **204**, for interfacing product data to an external product database. The interface header **3001** displays the name of the external product database. The interface allows the product database to be selected **3002** and searched **3003** using keywords. The results of the search are shown in the right panel of the interface. Once an item is found using its detail information **3005**, it can be selected **3004** and imported into the product data **301**.

FIG. **31** illustrates an embodiment of a user interface, provided by the resource planning system **204**, for selecting a product template. To create a new quote, one of the menu options **3101** is to copy the quote from a template. Hovering over this menu option **3101** displays a list **3102** of the available quote templates. The desired template can then be selected and used.

FIG. **32** illustrates an embodiment of a user interface, provided by the resource planning system **204**, for displaying and modifying a product bundle **1101** as previously described with respect to FIG. **11**. The display indicates the name **3201** of the bundle. Section **3202** of the user interface allows editing of the pricing options for the bundle. Section **3203** of the user interface lists the products that are included in the bundle. In one embodiment, the bundle contains two products **3204** and **3205** as shown in FIG. **32**.

FIG. **33** illustrates an embodiment of a user interface, provided by the resource planning system **204**, for selecting products to include in a product bundle. When adding a product to a bundle, the bundle user interface as previously described with respect to FIG. **32** remains in the background, and a product list **3301** is displayed on top of it. Selecting a product **3302** from the list adds it to the bundle being edited.

FIG. **34**A illustrates a flowchart of an embodiment of the steps taken to manage a business. In brief overview, the process starts at step **3801**. At step **3802**, the process can include storing product data in a product data module. At step **3803**, the process can include obtaining user input for a product class. At step **3804**, the process can include associating the product class with the product data indicated by the user. At step **3805**, the process can include obtaining additional user input for a business process, and at step **3806**, the process can include updating the business process with the product information from the product data selected by the user. At step **3807**, the process can include selecting a target business process based on the product class associated with that product data. At step **3808**, the process can include updating that target business process with the product information from the business process that was updated by the user. The process finishes at step **3809**.

FIG. **34**B illustrates a flowchart of an embodiment of the steps taken to group products. The process starts at step **3821**. Step **3822** stores product data in a product data module. Step **3823** gets user input for a product class, and step **3824** associates the product class with the product data indicated by the user. Step **3825** gets additional user input for a selection of products to include in a group, and step **3826** creates the group with that selection of products. Step **3827** gets additional user input to select a group and a business process, and step **3828** copies the products in the selected group into the selected business process. The loop starting at step **3829** uses the selected business process as a source business process, and for each product in the source business process, step **3830** selects a target business process based on the product class associated with that product, and step **3831** copies the products from the source business process to the target business process. When the loop is done with all the products in the source business process, the process finishes at step **3832**.

Embodiments of the subject matter and the operations described in this specification can be implemented in digital electronic circuitry, or in computer software, firmware, or hardware, including the structures disclosed in this specification and their structural equivalents, or in combinations of one or more of them. The subject matter described in this specification can be implemented as one or more computer programs, i.e., one or more circuits of computer program instructions, encoded on one or more computer storage media for execution by, or to control the operation of, data processing apparatus. Alternatively or in addition, the pro-

gram instructions can be encoded on an artificially generated propagated signal, e.g., a machine-generated electrical, optical, or electromagnetic signal that is generated to encode information for transmission to suitable receiver apparatus for execution by a data processing apparatus. A computer storage medium can be, or be included in, a computer-readable storage device, a computer-readable storage substrate, a random or serial access memory array or device, or a combination of one or more of them. Moreover, while a computer storage medium is not a propagated signal, a computer storage medium can be a source or destination of computer program instructions encoded in an artificially generated propagated signal. The computer storage medium can also be, or be included in, one or more separate components or media (e.g., multiple CDs, disks, or other storage devices).

It should be understood that the systems described above may provide multiple ones of any or each of those components and these components may be provided on either a standalone machine or, in some embodiments, on multiple machines in a distributed system. The systems and methods described above may be implemented as a method, apparatus or article of manufacture using programming and/or engineering techniques to produce software, firmware, hardware, or any combination thereof. In addition, the systems and methods described above may be provided as one or more computer-readable programs embodied on or in one or more articles of manufacture. The term "article of manufacture" as used herein is intended to encompass code or logic accessible from and embedded in one or more computer-readable devices, firmware, programmable logic, memory devices (e.g., EEPROMs, ROMs, PROMs, RAMs, SRAMs, etc.), hardware (e.g., integrated circuit chip, Field Programmable Gate Array (FPGA), Application Specific Integrated Circuit (ASIC), etc.), electronic devices, a computer readable non-volatile storage unit (e.g., CD-ROM, floppy disk, hard disk drive, etc.). The article of manufacture may be accessible from a file server providing access to the computer-readable programs via a network transmission line, wireless transmission media, signals propagating through space, radio waves, infrared signals, etc. The article of manufacture may be a flash memory card or a magnetic tape. The article of manufacture includes hardware logic as well as software or programmable code embedded in a computer readable medium that is executed by a processor. In general, the computer-readable programs may be implemented in any programming language, such as LISP, PERL, C, C++, C#, PROLOG, or in any byte code language such as JAVA. The software programs may be stored on or in one or more articles of manufacture as object code.

Similarly, while operations are depicted in the drawings in a particular order, this should not be understood as requiring that such operations be performed in the particular order shown or in sequential order, or that all illustrated operations be performed, to achieve desirable results. In certain circumstances, multitasking and parallel processing may be advantageous. Moreover, the separation of various system components in the embodiments described above should not be understood as requiring such separation in all embodiments, and it should be understood that the described program components and systems can generally be integrated in a single software product or packaged into multiple software products.

References to "or" may be construed as inclusive so that any terms described using "or" may indicate any of a single, more than one, and all of the described terms.

Thus, particular embodiments of the subject matter have been described. Other embodiments are within the scope of the following claims. In some cases, the actions recited in the claims can be performed in a different order and still achieve desirable results. In addition, the processes depicted in the accompanying figures do not necessarily require the particular order shown, or sequential order, to achieve desirable results. In certain embodiments, multitasking and parallel processing may be advantageous.

While this specification contains many specific implementation details, these should not be construed as limitations on the scope of any inventions or of what may be claimed, but rather as descriptions of features specific to particular implementations of particular inventions. Certain features described in this specification in the context of separate embodiments can also be implemented in combination in a single embodiment. Conversely, various features described in the context of a single embodiment can also be implemented in multiple embodiments separately or in any suitable subcombination. Moreover, although features may be described above as acting in certain combinations and even initially claimed as such, one or more features from a claimed combination can in some cases be excised from the combination, and the claimed combination may be directed to a subcombination or variation of a subcombination.

What is claimed is:

1. A system to reduce data propagation errors between modules via a shared resource, comprising:

a first device comprising at least one processor and memory;

at least one additional device comprising at least one processor;

a product data module executed by the first device to manage a data structure, in the memory of the first device, configured with a labor class to describe services performed by an entity, a parts class to describe items to be purchased and delivered to a customer, and an agreements class to describe actions performed periodically for the customer;

the product data module executed by the first device to manage, in one or more line items of the data structure, a first product having a first product description and a product class corresponding to at least one of the labor class, the parts class or the agreements class, the product class indicating product association with one or more processing modules;

the first device interfacing with a first application interface program (API) to convey information between the product data module and a first external processing module executed by one or more additional devices, a second API to convey information between the product data module and a second external processing module executed by one or more additional devices, a third API to convey information between the product data module and a third external processing module executed by one or more additional devices, and a fourth API to convey information between the product data module and external databases, wherein each of the first external processing module, second external processing module, third external processing module, and external databases are configured to convey information between one another via a respective API that interfaces with the product data module to reduce a number of APIs used to communicate information and reduce data propagation errors;

a quoting module of a plurality of process modules executed by the first at least one additional device to:

retrieve, via an interface of the quoting module, from the data structure in memory managed by the product data module and communicatively coupled to the at least one processor, the one or more line items comprising the first product description of the first product managed by the product data module, the first product description including quoting information in a first format;

identify, based on the first product description, that the product class includes an agreements product;

select, from the plurality of process modules, based on the product class including the agreements product, an invoicing and collection module of the plurality of process modules configured to interface with the product data module;

transmit, to the invoicing and collection module, the first product description of the first product in the first format to enable the invoicing and collection module to create an invoice; and

the invoicing and collection module executed by the at least one additional device to:

create, responsive to receiving the first product description of the first product, the invoice;

access, via an interface of the invoicing and collection module, the data structure in memory managed by the product data module executed by the first device;

modify, via the interface of the invoicing and collection module, the one or more line items for the first product in the data structure in memory managed by the product data module executed by the first device with an updated product description including invoicing information from the invoice,

wherein the interface of the quoting module executed by one or more of the additional device(s) and the interface of the invoicing and collection module executed by one or more of the additional device(s) are both configured to reduce data propagation errors by accessing and updating the same one or more line items in the same data structure in memory managed by the product data module executed by the first device to cause the quoting module executed by one or more of the additional device(s) to synchronize with the invoicing and collection module executed by one or more of the additional device(s) such that the quoting information matches the invoicing information.

2. The system of claim **1**, wherein a second product class comprises a parts product and further comprises a product sub-class, and the at least one processor is further configured to:

identify, based on a second product description, a product sub-class for the parts product, the product sub-class including at least one of an inventory parts products and a non-inventory parts product.

3. The system of claim **1**, wherein:

the plurality of process modules comprise at least one of:

a sales management module;

a procurement module;

a delivery and setup module;

a project planning module;

an invoicing and collection module;

a payables module;

a contract management module;

a maintenance module;

a support module; and

a customer relationship management module.

4. The system of claim **1**, wherein:

the first product description includes the quoting information associated with the quote generated by the quoting module; and

invoicing and collection module generates a second product including a second product description, the second product including the invoice and the second product description including the invoicing information, wherein the quoting information matches the invoicing information.

5. The system of claim **1**, further comprising an application programming interface to an external process module, wherein the application programming interface is communicatively coupled to the product data module and the at least one processor is further configured to:

transmit, via the product data module to the external process module, a second product;

receive, from the external process module, an external product, the external product comprising an external product description;

select, based on a product class of the external product, a third process module of the plurality of process modules;

transmit, to the selected third process module, the external product description; and

control the third process module to execute a third process based on the external product description and external product class, the third process generating a third product description that substantially matches the external product description.

6. The system of claim **5**, wherein the external process module comprises at least one of:

an external sales management system;

an external quoting system;

an external accounting system; and

an external product database system.

7. The system of claim **1**, wherein the at least one processor is further configured to:

receive a first plurality of products, each of the first plurality of products comprising a product description;

store the first plurality of products in the product data module; and

obtain a second plurality of products from the product data module, the second plurality of products comprising at least a subset of the first plurality of products and further comprising the first product description.

8. The system of claim **7**, wherein the at least one processor is further configured to:

identify, based on the execution of the invoicing and collection module, a second product of the second plurality of products, the second product comprising a second product description;

identify, based on the second product description, a second product class, the second product class including at least one of a labor product, a parts product, and the agreements product;

select, based on the second product class, a third process module of the plurality of process modules, the third process module configured to interface with the product data module;

transmit, to the selected third process module, the second product description of the second product; and

control the third process module to execute a third process based on at least one of the second product description and the second product class.

9. The system of claim **8**, wherein the at least one processor is further configured to:

receive a user identifier corresponding to a user of the system;

set, responsive to a hiding policy, a hiding status for at least one product description of the second plurality of products;

generate a document based on the at least one product description associated with the third process module; and

omit, from the document, based on the hiding status, at least one of a price and a product number of a third product description generated by the third process module.

10. A method of reducing data propagation errors between modules via a shared resource, comprising:

managing, by a product data module executed by at least one processor of a first device, a data structure, in memory of the first device, configured with a labor class to describe services performed by an entity, a parts class to describe items to be purchased and delivered to a customer, and an agreements class to describe actions performed periodically for the customer;

storing, by the product data module executed by the first device, in one or more line items of the data structure in memory communicatively coupled to the at least one processor and managed by the product data module, a first product description of a first product having a product class corresponding to at least one of the labor class, the parts class or the agreements class, the first product description in a first format associated with at least one of a plurality of process modules, the product class indicating product association with one or more processing modules;

interfacing, by the first device, with a first application interface program (API) to convey information between the product data module and a first external processing module executed by one or more additional devices;

interfacing, by the first device, with a second API to convey information between the product data module and a second external processing module executed by one or more additional devices;

interfacing, by the first device, with a third API to convey information between the product data module and a third external processing module executed by one or more additional devices,

interfacing, by the first device, with a fourth API to convey information between the product data module and external databases, wherein each of the first external processing module, second external processing module, third external processing module, and external databases are configured to convey information between one another via a respective API that interfaces with the product data module to reduce a number of APIs used to communicate information and reduce data propagation errors;

retrieving, by a quoting module of the plurality of process modules executed by a second device, via an interface of the quoting module, the one or more line items comprising the first product description of the first product from the data structure in memory managed by the product data module, the first product description including quoting information in the first format;

identifying, by the quoting module executed by the second device, based on the first product description, a product class that includes an agreements product;

selecting, by the quoting module from the plurality of process modules, based on the product class including the agreements product, an invoicing and collection module of the plurality of process modules, the invoicing and collection module configured to interface with the product data module;

transmitting, by the quoting module to the invoicing and collection module executed by the second device, the first product description of the first product in the first format to enable the invoicing and collection module to create an invoice;

creating, by the invoicing and collection module executed by the second device serve responsive to receiving the first product description of the first product, the invoice;

accessing, via an interface of the invoicing and collection module executed by the second device, the data structure in memory managed by the product data module; and

modifying, by the invoicing and collection module via the interface of the invoicing and collection module, the one or more line items for the first product in the data structure in memory managed by the product data module with an updated product description including invoicing information from the invoice,

wherein the interface of the quoting module executed by the second device and the interface of the invoicing and collection module executed by the second device are both configured to reduce data propagation errors by accessing and updating the same one or more line items in the same data structure in memory managed by the product data module executed by the first server to cause the quoting module to synchronize with the invoicing and collection module such that the quoting information matches the invoicing information.

11. The method of claim **10**, wherein a second product class comprises a parts product and further comprises a product sub-class, and the method further comprises:

identifying, based on a second product description, a product sub-class for the parts product, the product sub-class including at least one of an inventory parts products and a non-inventory parts product.

12. The method of claim **10**, wherein:

the plurality of process modules comprise at least one of:

a sales management module;

a procurement module;

a delivery and setup module;

a project planning module;

an invoicing and collection module;

a payables module;

a contract management module;

a maintenance module;

a support module; and

a customer relationship management module.

13. The method of claim **10**, wherein:

the first product description includes the quoting information associated with the quote generated by the quoting module; and

the invoicing and collection module generates a second product including a second product description, the second product including the invoice and the second product description including the invoicing information,

wherein the quoting information matches the invoicing information.

14. The method of claim 10, further comprising:
transmitting, via an application programming interface communicatively coupled to the product data module and an external process module, the first product updated with the invoice;
receiving, from the external process module, an external product, the external product comprising an external product description;
selecting, based on a product class of the external product, a third process module of the plurality of process modules;
transmitting, to the selected third process module, the external product description; and
controlling the third process module to execute a third process based on the external product description and external product class, the third process generating a third product description that substantially matches the external product description.

15. The method of claim 14, wherein the external process module comprises at least one of:
an external sales management method;
an external quoting system;
an external accounting method; and
an external product database method.

16. The method of claim 10, further comprising:
receiving a first plurality of products, each of the first plurality of products comprising a product description;
storing the first plurality of products in the product data module; and
obtaining a second plurality of products from the product data module, the second plurality of products comprising at least a subset of the first plurality of products and further comprising the first product description.

17. The method of claim 16, further comprising:
identifying, based on the execution of the invoicing and collection module, a second product of the second plurality of products, the second product comprising a second product description;
identifying, based on the second product description, a second product class, the second product class including at least one of a labor product, a parts product, and the agreements product;
selecting, based on the second product class, a third process module of the plurality of process modules, the third process module configured to interface with the product data module;
transmitting, to the selected third process module, the second product description of the second product; and
controlling the third process module to execute a third process based on at least one of the second product description and the second product class.

18. The method of claim 17, further comprising:
receiving a user identifier corresponding to a user of the method;
setting, responsive to a hiding policy, a hiding status for at least one product description of the second plurality of products;
generating a document based on the at least one product description associated with the third process module; and
omitting, from the document, based on the hiding status, at least one of a price and a product number of a third product description generated by the third process module.

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